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THE INFLUENCE OF SWEEP ON THE AERODYNAMIC LOADING
OF AN OSCILLATING NACA0012 AIRFOIL
VOLUME II - DATA REPORT

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THE INFLUENCE OF SWEEP ON THE
AERODYNAMIC LOADING OF AN OSCILLATING
NACA 0012 AIRFOIL. VOLUME II - DATA REPORT

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SUMMARY

An experimental investigation was conducted to determine the effect of sweep on the dynamic response of the NACA 0012 airfoil. Unsteady chordwise distributed pressure data were obtained from a tunnel spanning wing equipped with 21 single surface transducers (13 on the suction side and 8 on the pressure side of the airfoil). The test equipment and procedures are described in Volume I of this report (Ref. 1).

The pressure data were obtained at pitching amplitudes of 8 and 10 degrees over a tunnel Mach number range of 0.10 to 0.46 and a pitching frequency range of 2.5 to 10.6 cycles per second. The wing was oscillated in the unswept and swept positions about the quarter-chord pivot axis relative to mean incidence angle settings of 0, 9, 12, and 15 degrees.

The experimental results of this program are presented in two volumes. The first volume (Ref. 1) describes the test procedure and discusses some of the key results from sample cases. The present volume is a compilation of all the response data obtained during the test program. These data are in the form of normal force, chord force, lift force, pressure drag, and moment hysteresis loops derived from chordwise integrations of the unsteady pressure distributions.

The hysteresis loops are organized in two main sections. In the first section, the loop data are arranged to show the effect of sweep ($\Lambda = 0$ and 30°) for all available combinations of mean incidence angle, pitching amplitude, reduced frequency, and chordwise Mach number. The second section shows the effect of chordwise Mach number ($M_c = 0.30$ and $M_c = 0.40$) on the swept wing response for all available combinations of mean incidence angle, pitching amplitude, and reduced frequency.

WIND TUNNEL AND EXPERIMENTAL EQUIPMENT

Tests were conducted in the 2.44 m (8 ft) octagonal test section of the UTRC Main Wind Tunnel (MWT). This is a single return, closed throat facility with a maximum speed capability in the test section of approximately $M = 0.9$. The present test program was conducted over a range of freestream Mach number from $M_\infty = 0.1$ to $M_\infty = 0.46$. The stagnation temperature of the airstream was held constant over the range 16°C to 60°C (60°F to 140°F), and the tunnel stagnation pressure was equal to atmospheric pressure. Hence, at the $M_\infty = 0.3$ operating condition for the present test the Reynolds number was approximately $\text{Re}/L = 6.82 \times 10^6/\text{m}$ ($= 2.08 \times 10^6/\text{ft}$), and for the 40.64 cm (16 in) chord model, $\text{Re} = 2.77 \times 10^6$.

The tunnel spanning wing consisted of a rectangular steel spar onto which a NACA 0012 airfoil-shaped shell was mounted to provide the test configuration. In this test program, end pieces were used to extend the spar for installation in the swept position and sliding seals were introduced at each end of the span to prevent tunnel leakage. The tunnel spanning wing model and its oscillatory drive system were supported outside the tunnel walls. The linkage connecting the motor drive to each end of the tunnel spanning model consisted of an eccentric cam, a vertical push rod, and a crank (see Fig. 4 of Ref. 1). The latter was securely fastened to the shaft ends of the tunnel spanning model by means of a compression ring coupling device. The resulting airfoil pitching motion was sinusoidal with only a 0.5 percent second harmonic distortion.

The unsteady pressure distribution was measured using single surface miniature pressure transducers arranged in a chordwise array normal to the span. The suction surface contained 13 transducers and 8 were placed on the pressure surface. The angular displacement of the wing was measured using a rotary potentiometer. A detailed description of the test facility and instrumentation is presented in Ref. 1.

TEST PROGRAM

Unsteady data were obtained for the matrix of parameters shown in the table following this section. These parameters were the sweep angle, Λ , the amplitude of the motion, $\bar{\alpha}$, the mean incidence angle, α_M , the pitching frequency, f , and the approach Mach number, M_∞ . In this study, the test results were compared on the basis of the chordwise Mach number normal to the leading edge, $M_c = M_\infty \cos \Lambda$.

The unswept portion of the test was conducted first at $M_c = 0.30$ and 0.40 for three values of frequency, $f = 4, 8, \text{ and } 10$ cps. The same three frequencies were matched at both Mach numbers during the swept wing test thus providing the first set of comparisons shown on pages through . In addition, a chordwise reduced frequency match was obtained between the two Mach numbers during the swept wing test. Specifically, the frequencies used were $f = 4, 6, \text{ and } 8$ cps at $M_c = 0.30$, and $f = 5.33, 8, \text{ and } 10.67$ cps at $M_c = 0.40$. The latter results are presented in the second set of comparisons (cf pages through).

COMPUTATIONAL PROCEDURE

The total unsteady aerodynamic normal force, chord force (excluding effects due to viscous drag), and moment are obtained by integrating the time-dependent pressure distribution on each surface independently and then taking the difference between the upper and lower surface loads. The equations are:

$$N(t) = - \int_0^c (p_u(x,t) + p_s(x)) dx + \int_0^c (p_u(x,t) + p_s(x)) dx,$$

suction surface pressure surface

$$C(t) = - \int_0^c (p_u(x,t) + p_s(x)) \frac{\partial y}{\partial x} dx + \int_0^c (p_u(x,t) + p_s(x)) \frac{\partial y}{\partial x} dx,$$

suction surface pressure surface

and

$$M(t) = \int_0^c (p_u(x,t) + p_s(x))(x-\beta c) dx$$

suction surface

$$- \int_0^c (p_u(x,t) + p_s(x))(x-\beta c) dx$$

pressure surface

where subscripts u and s represent the unsteady and steady-state values, respectively. The quantity c is the airfoil chord length and βc is the pivot axis location relative to the leading edge. In the present case, $\beta = 0.25$. The sign convention used in these expressions defines the normal force, $N(t)$, the chord force, $C(t)$, and the moment, $M(t)$, to be positive in the upward, upstream, and nose up directions, respectively.

Although the airfoil was tested in the unswept ($\Lambda = 0$ deg) and swept ($\Lambda = 30$ deg) configurations, the evaluation of $N(t)$, $C(t)$, and $M(t)$ is independent of Λ because the integrations are chordwise rather than streamwise. The effects of sweep on these quantities occur implicitly in the measured responses and are approximately accounted for by nondimensionalizing the integrated results with respect to the velocity component normal to the leading edge. The normal force, chord force, and moment coefficients become

$$C_N(t) = N(t)/c q \cos^2 \Lambda$$

$$C_C(t) = C(t)/c q \cos^2 \Lambda$$

and

$$C_M(t) = M(t)/c^2 q \cos^2 \Lambda$$

respectively. This nondimensionalization scheme is based on a steady-state sweep analysis which assumes the flow to be potential and the pressure distribution on the wing to be determined entirely by the magnitude of the normal velocity component, $V_\infty \cos \Lambda$. Although these assumptions may not be consistent with the actual flow environment, the approach is being used as a matter of convenience.

Finally, the normal force and chord force components were used to obtain the unsteady lift and pressure drag coefficients of the induced aerodynamic load,

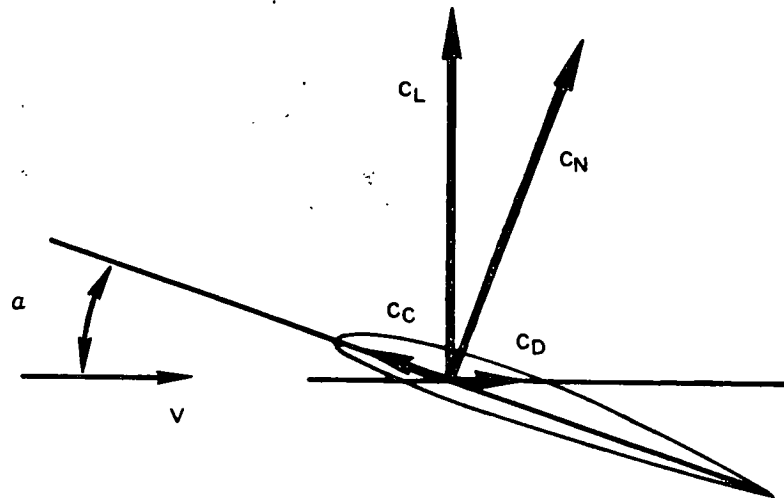
$$C_L = C_N \cos \alpha + C_C \sin \alpha$$

$$C_D = C_N \sin \alpha - C_C \cos \alpha$$

respectively. In these equations, α is given by

$$\alpha = \alpha_M + \bar{\alpha} \sin \omega t.$$

A schematic depicting the load configuration is shown below.



1. St. Hilaire, A. O., F. O. Carta, M. R. Fink, and W. D. Jepson: The Influence of Sweep on the Aerodynamic Loading of an Oscillating NACA 0012 Airfoil. Volume I - Technical Report. NASA CR-3042, 1979.

UNSTEADY TEST MATRIX FOR NACA0012 AIRFOIL

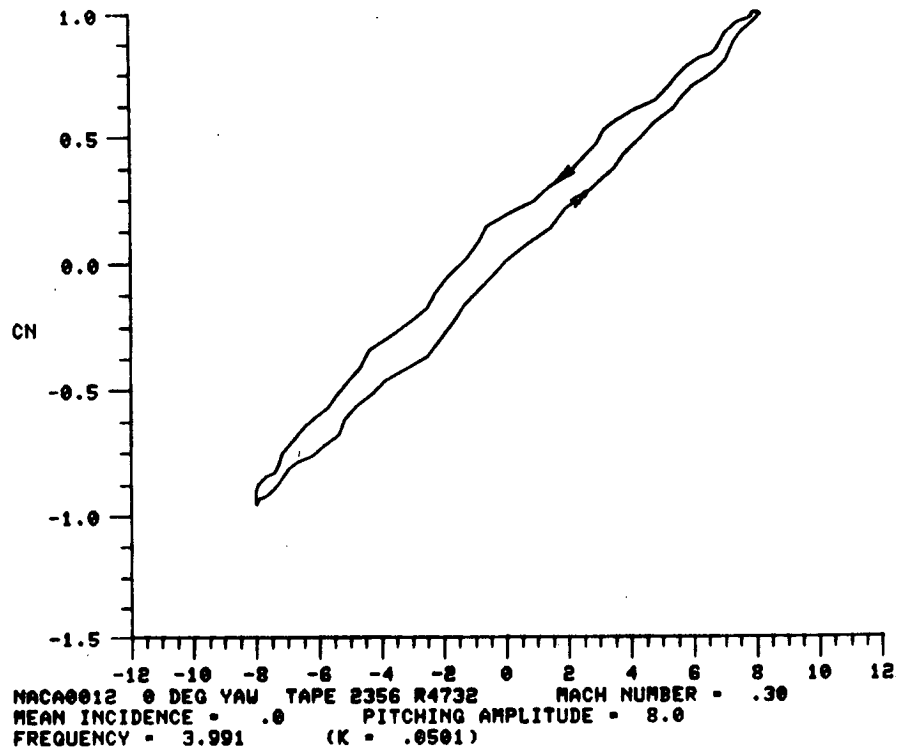
Airfoil	Λ (deg)	$\bar{\alpha}$ (deg)	α_M (deg)	M_∞	M_C	f (cps)					
						4	5.33	6	8	10	10.67
NACA0012 ↓	0 ↓	8 ↓ 10 ↓	0 " 9 " 12 " 15 " 0 " 9 " 12 "	.3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4	.3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4	X X X X X X X X X X X X X X			X X X X X X X X X X X X	X X X X X X X X X X X X	
NACA0012 ↓	30 ↓	8 ↓ 10 ↓	0 " 9 " 12 " 15 " 9 " 12 " 15 "	.346 .462 .346 .462 .346 .462 .346 .462 .346 .462 .346 .462 .346 .462	.3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4 .3 .4	X X X X X X X X X X X X X X		X X X X X X X X X X X X	X X X X X X X X X X X X X	X X X X X X X X X X X X	X X X X X X X X X X X
Additional Test Points:						f (cps)					
NACA0012	30	10	15	.104	.09	2.5	3.75	5	6.25		

EFFECT OF SWEEP ON THE NORMAL FORCE RESPONSE *

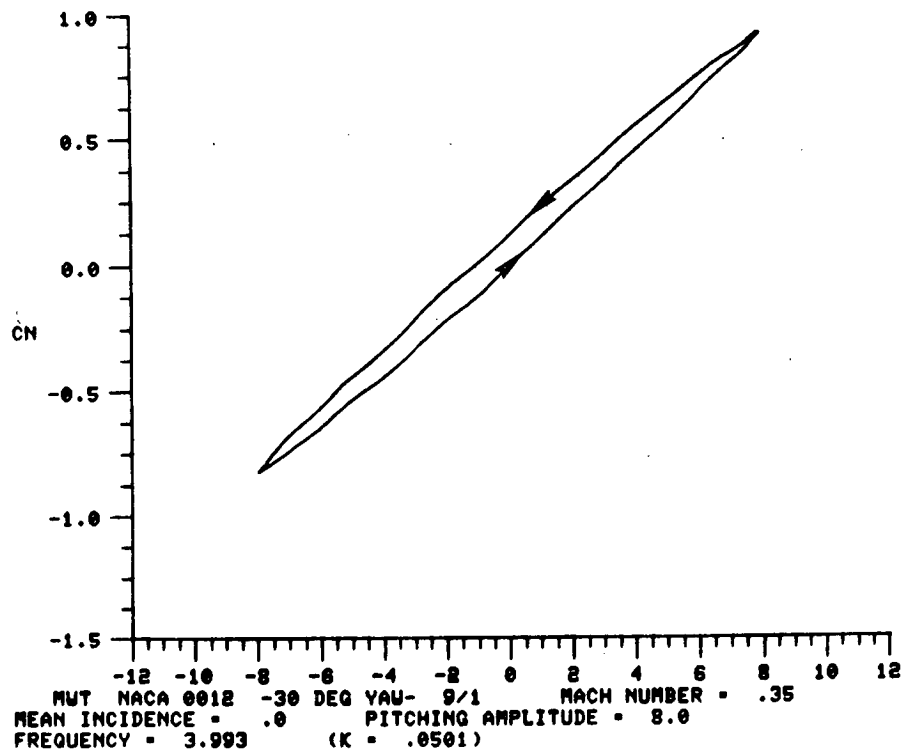
<u>Chordwise Mach Number</u>	<u>Mean Incidence Angle</u>	<u>Frequency</u>	<u>Reduced Frequency</u>	<u>Page</u> *
0.30	0	4.0	.050	8, 9
↓	↓	8.0	.100	10,11
↓	↓	10.0	.124	12,13
↓	9	4.0	.050	14,15
↓	↓	8.0	.100	16,17
↓	↓	10.0	.124	18,19
↓	12	4.0	.050	20,21
↓	↓	8.0	.100	22,23
↓	↓	10.0	.124	24,25
↓	15	4.0	.050	26,27
↓	↓	8.0	.100	28,29
↓	↓	10.0	.124	30,31
0.40	0	4.0	.037	32,33
↓	↓	8.0	.075	34,35
↓	↓	10.0	.093	36,37
↓	9	4.0	.037	38,39
↓	↓	8.0	.075	40,41
↓	↓	10.0	.093	42,43
↓	12	4.0	.037	44,45
↓	↓	8.0	.075	46,47
↓	↓	10.0	.093	48,49
↓	15	4.0	.037	50,51
↓	↓	8.0	.075	52,53
↓	↓	10.0	.093	54,55

* The effect of sweep is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

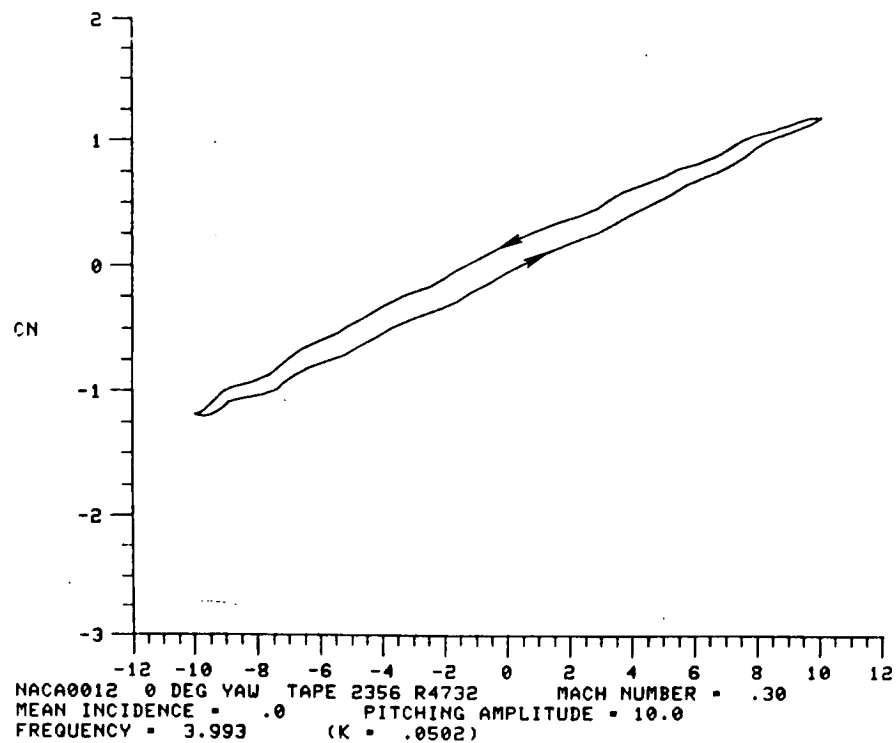
FILE 21. RUN 53.001



FILE 8. RUN1007.005

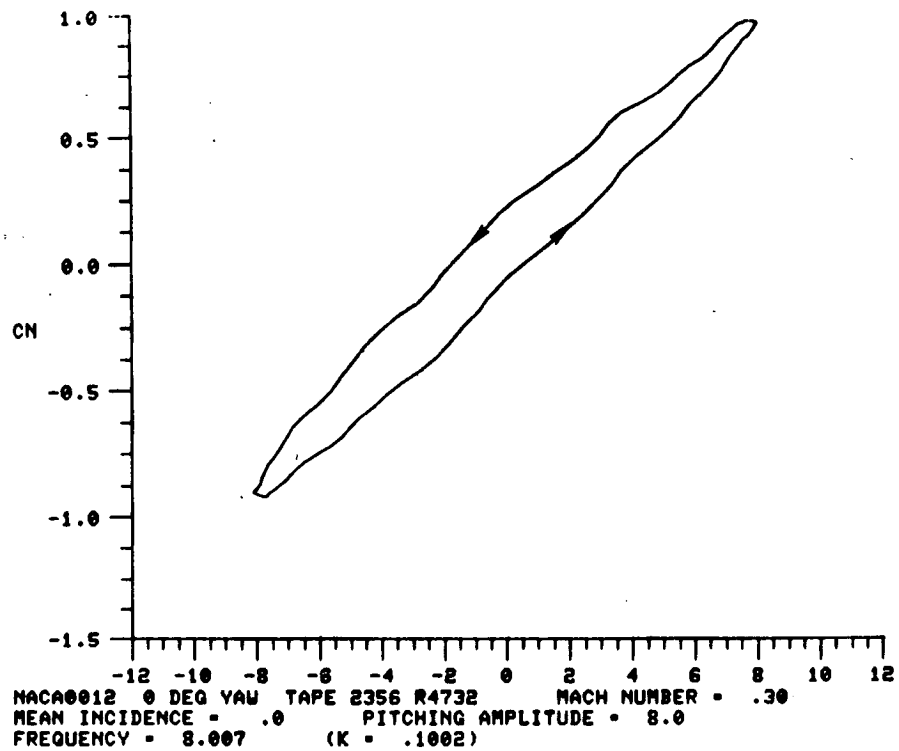


FILE 27. RUN 57.001

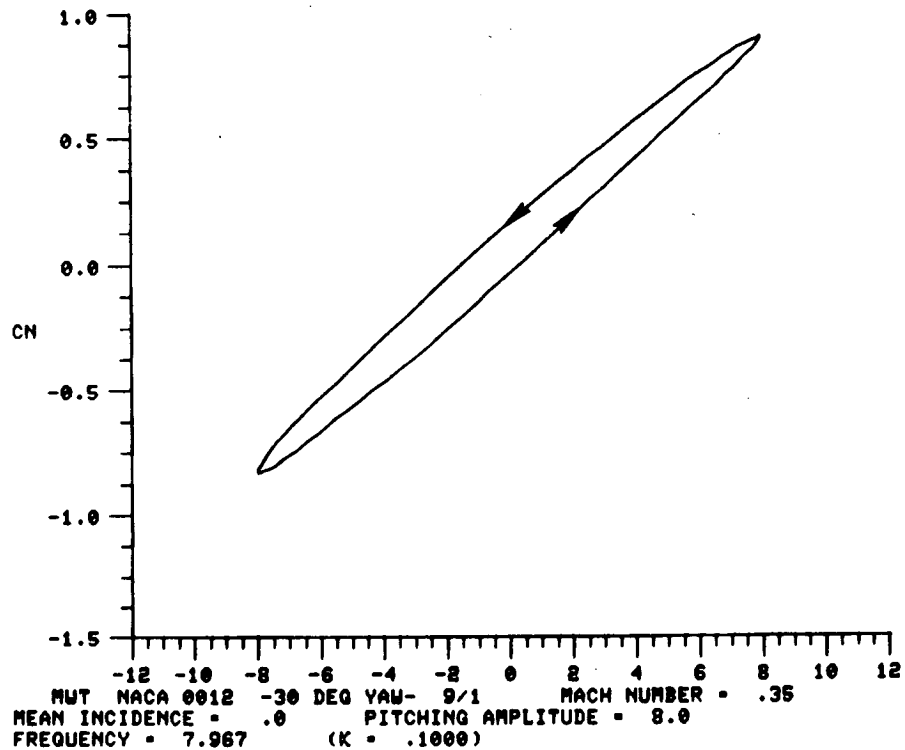


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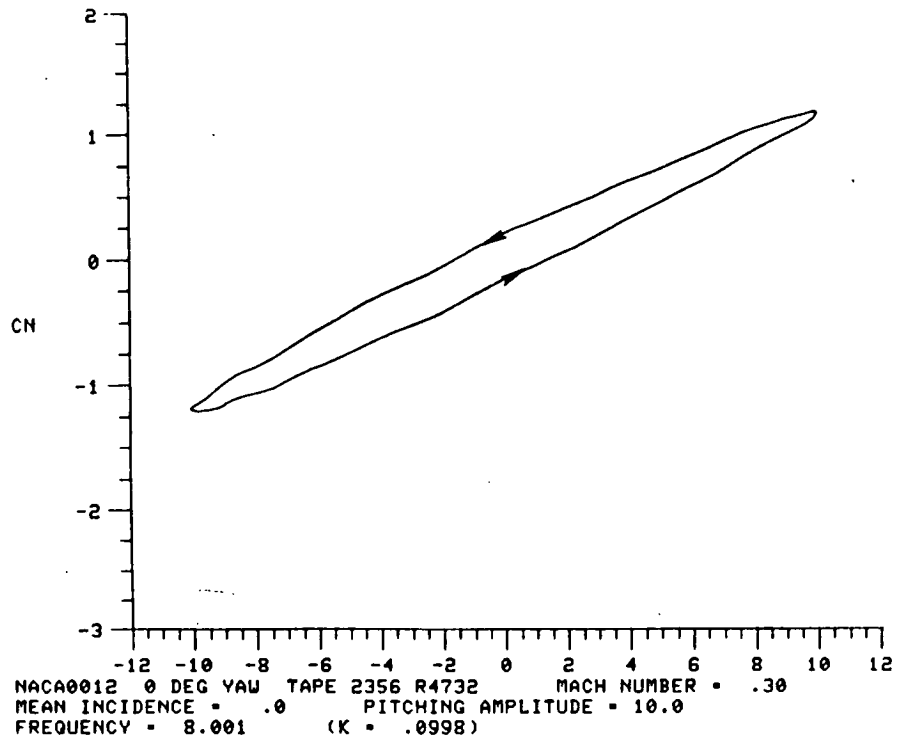
FILE 22. RUN 53.003



FILE 10. RUN1007.009

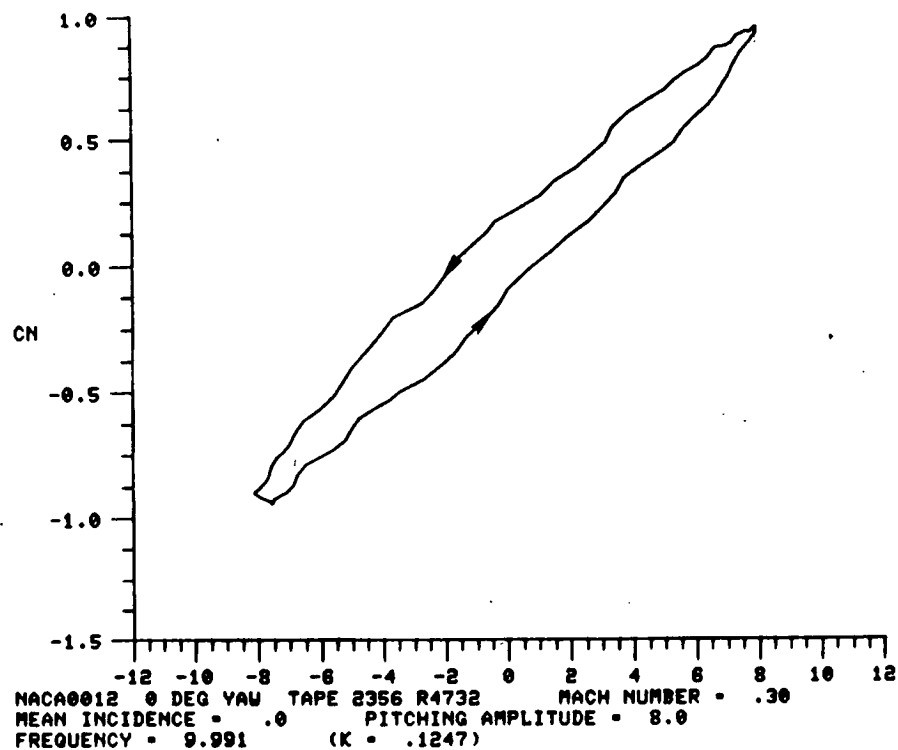


FILE 28. RUN 57.003

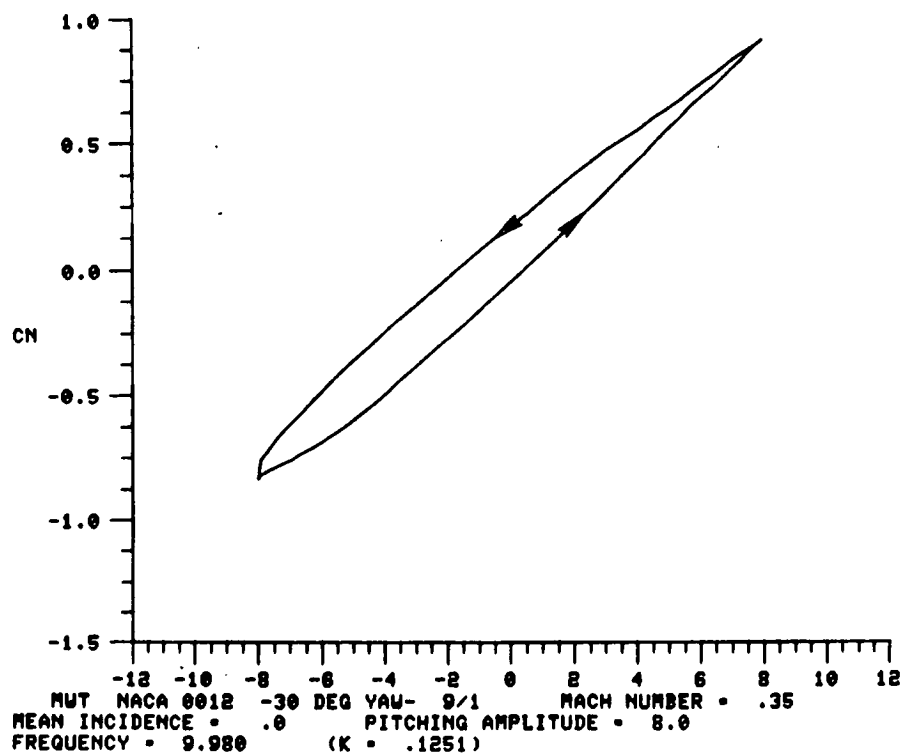


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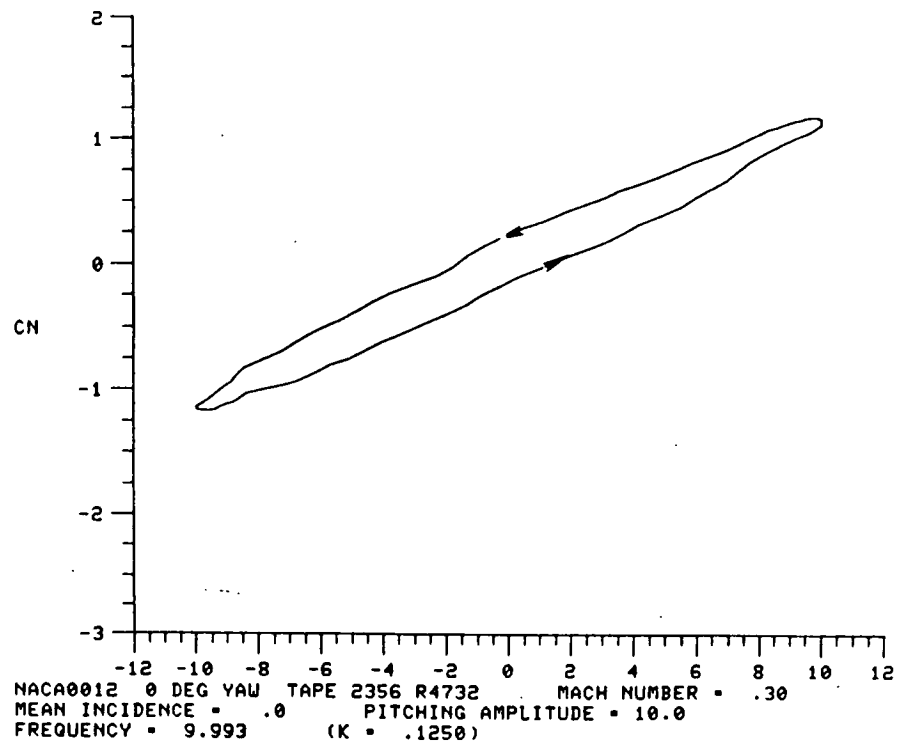
FILE 23. RUN 53.005



FILE 11. RUN1007.011

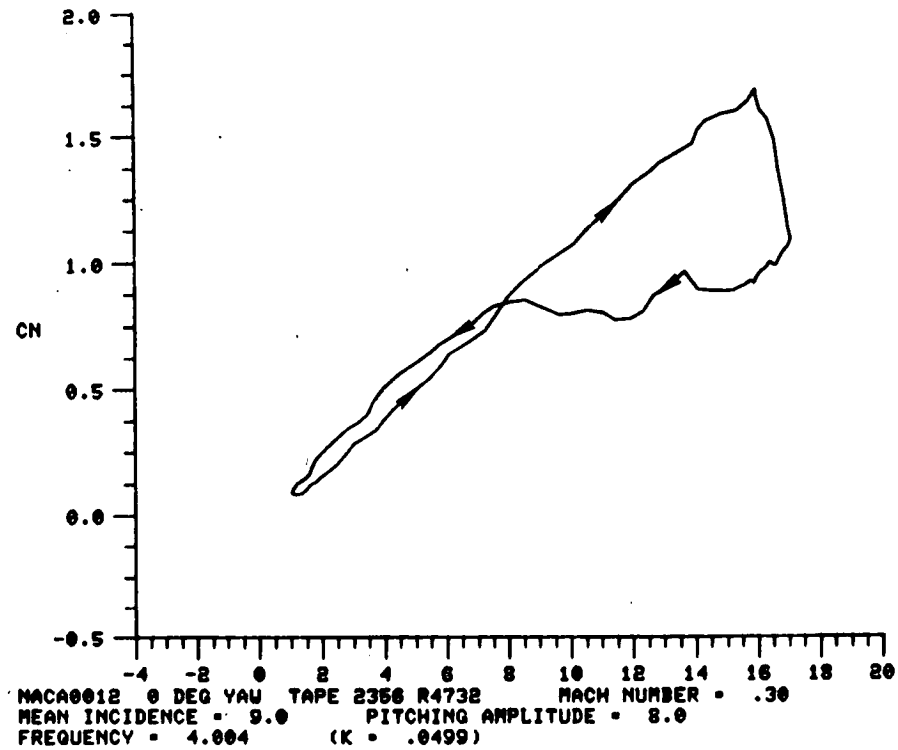


FILE 29. RUN 57.005

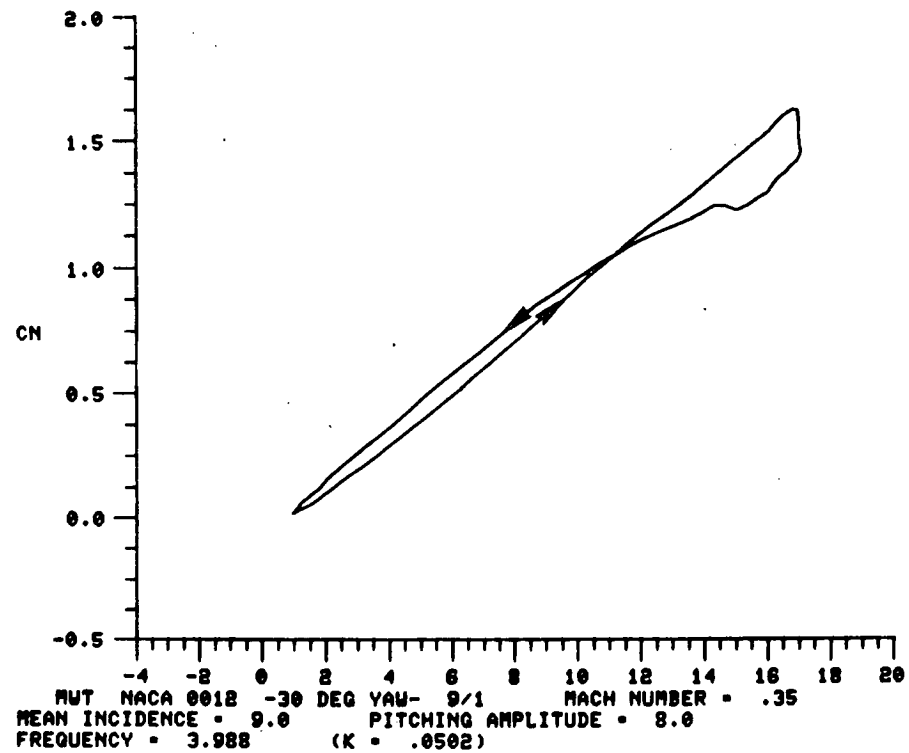


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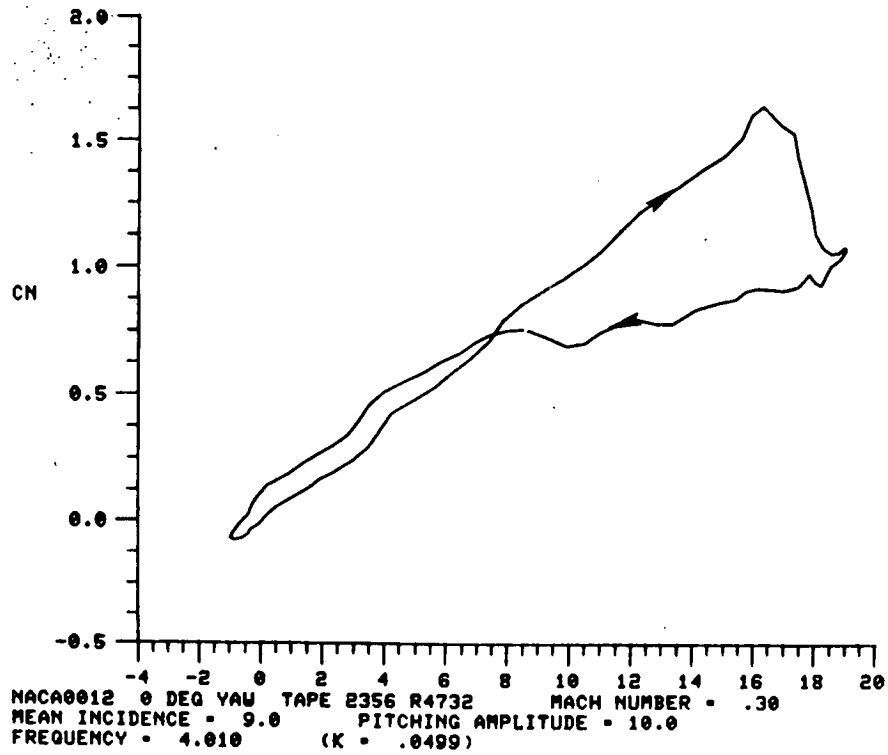
FILE 3. RUN 47.001



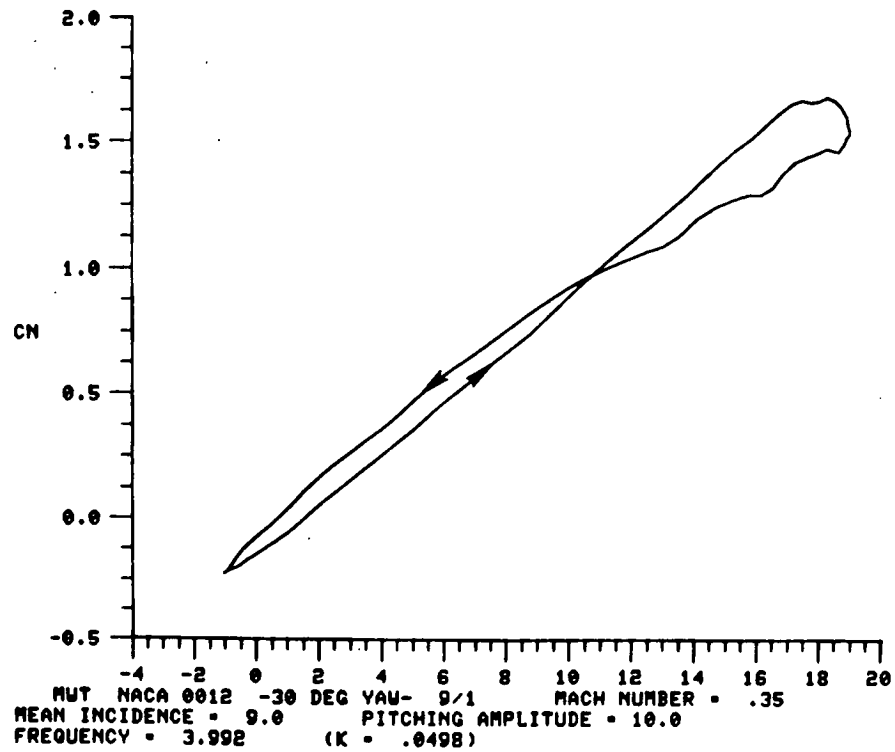
FILE 26. RUN1018.013



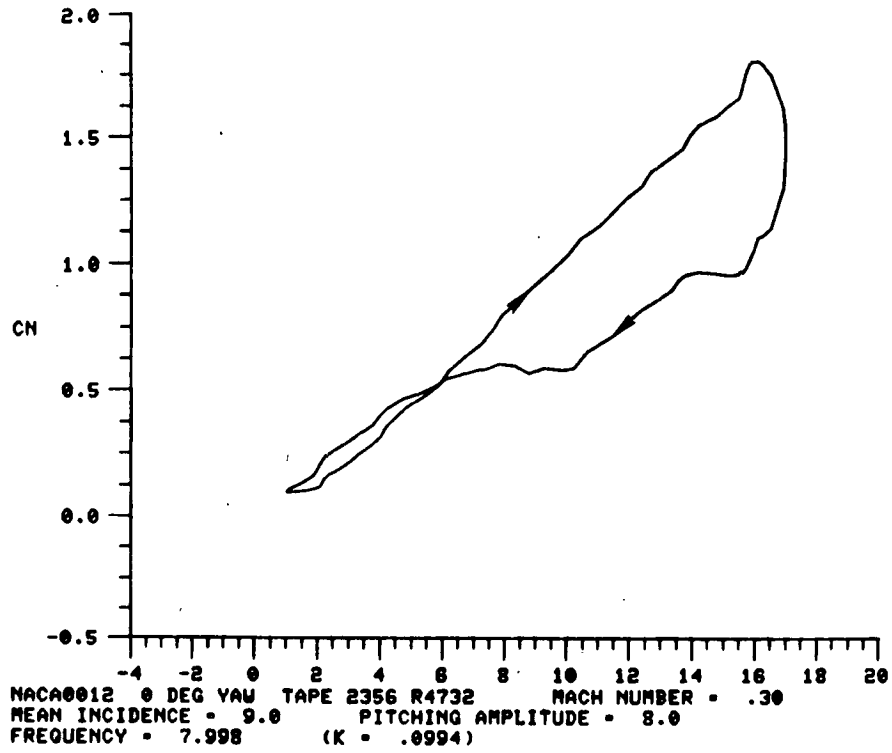
FILE 39. RUN 61.001



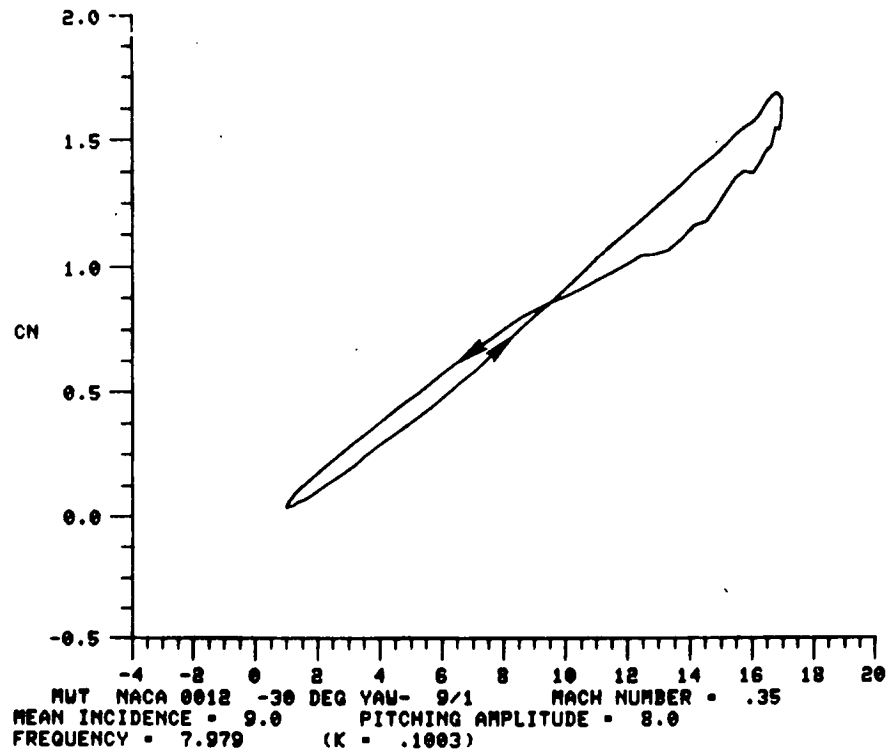
FILE 6. RUN1029.008



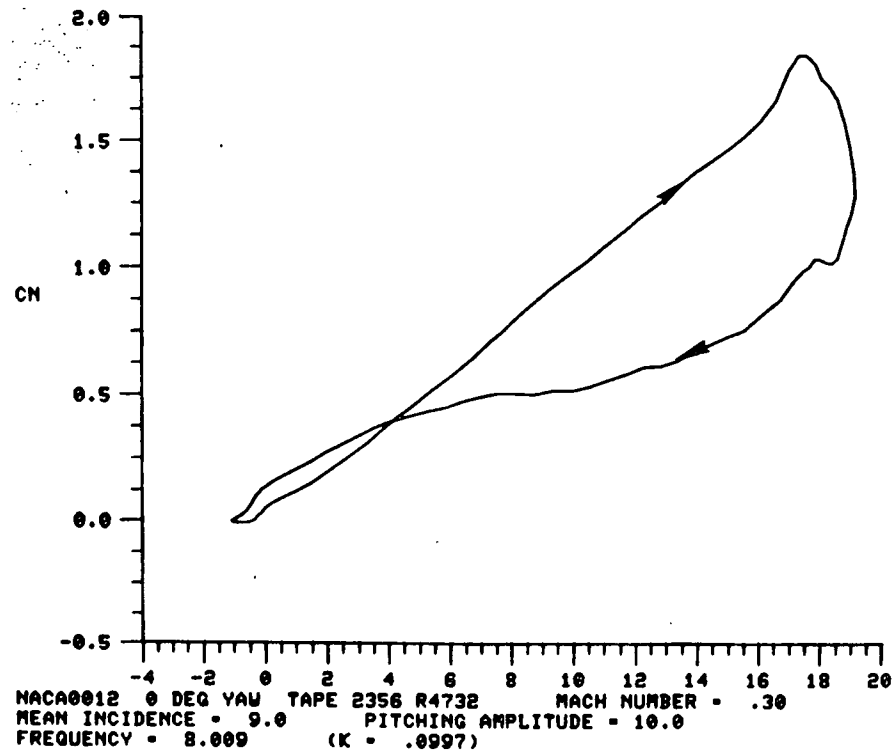
FILE 4. RUN 47.003



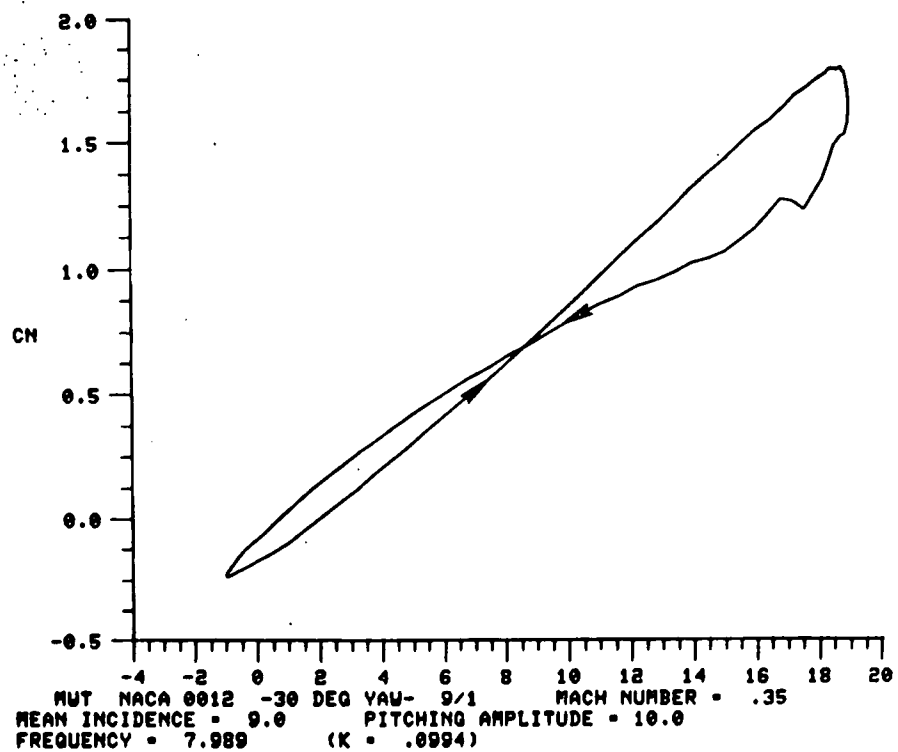
FILE 28. RUN1018.017



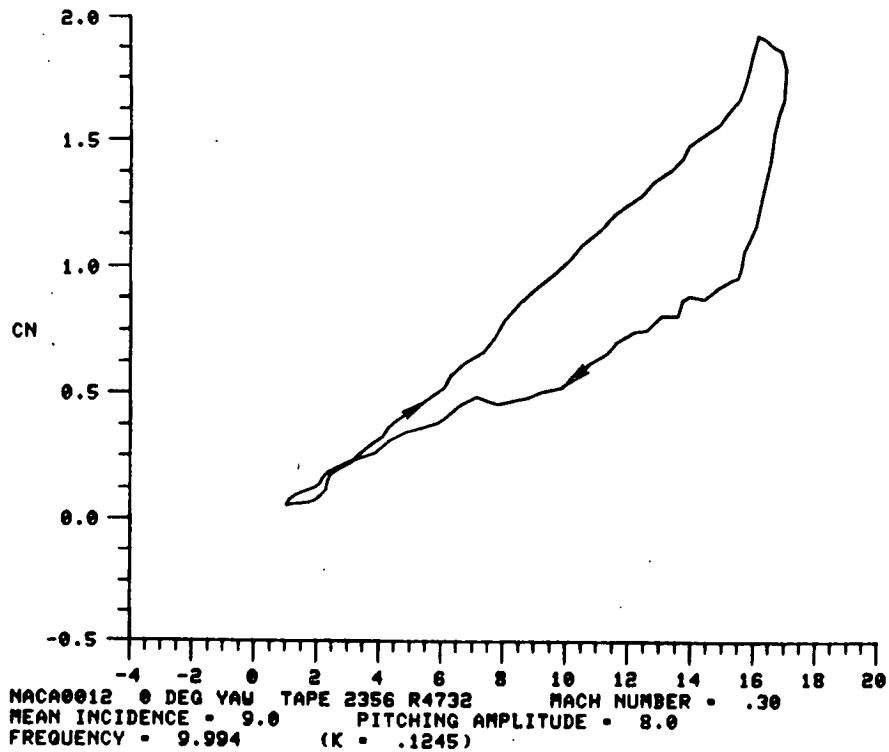
FILE 40. RUN 61.004



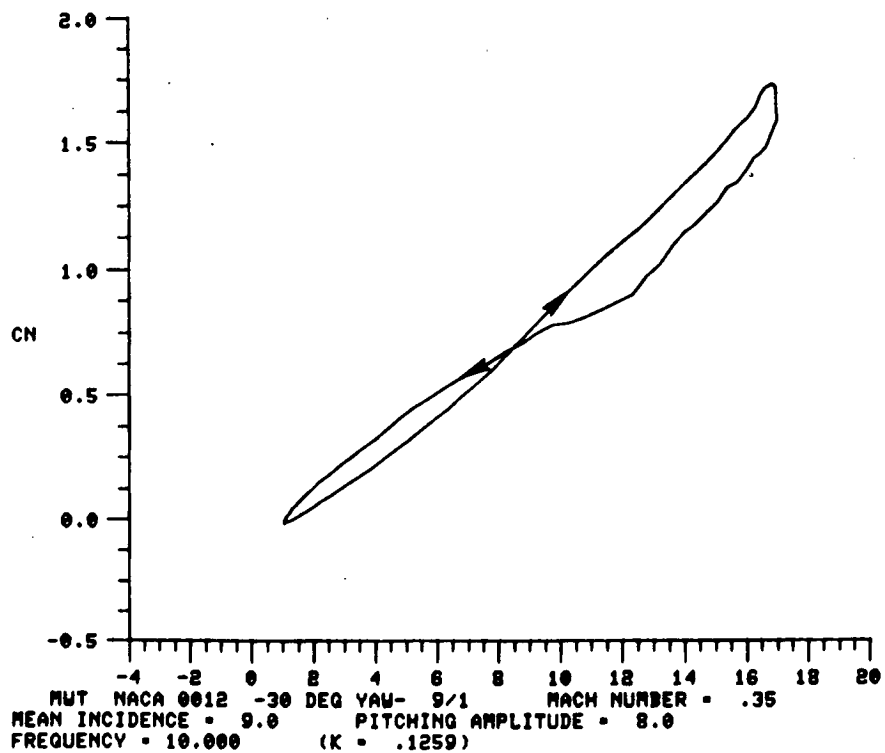
FILE 8. RUN1029.012



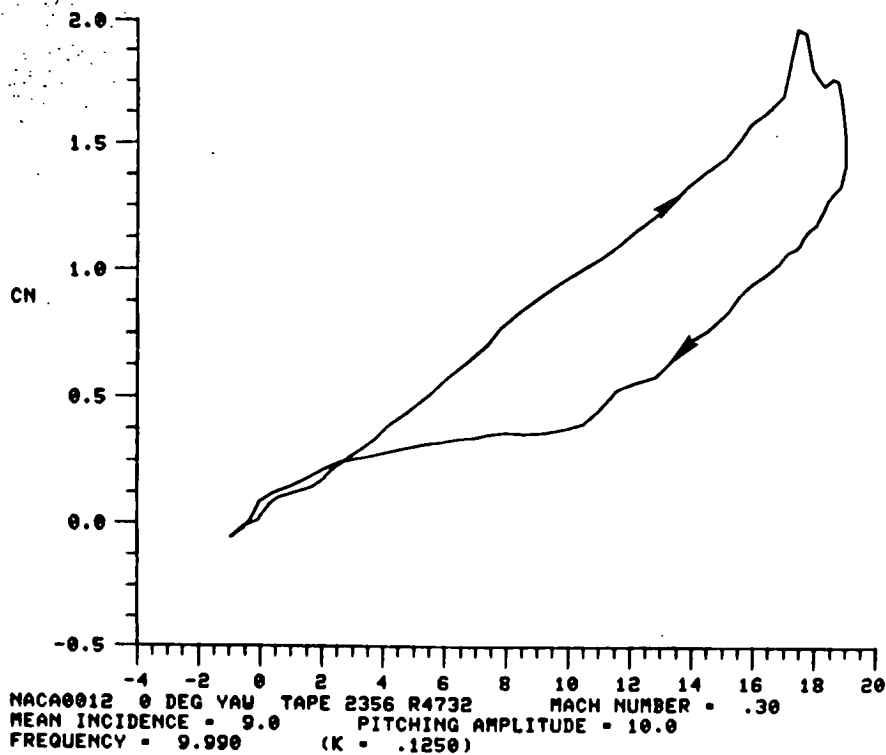
FILE 5. RUN 47.005



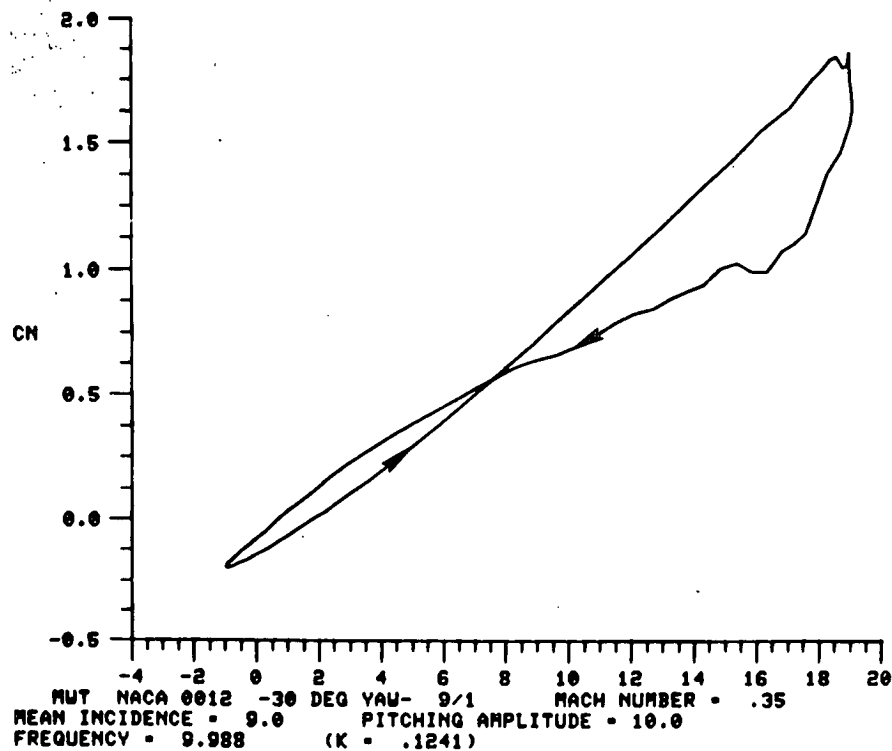
FILE 29. RUN1018.019



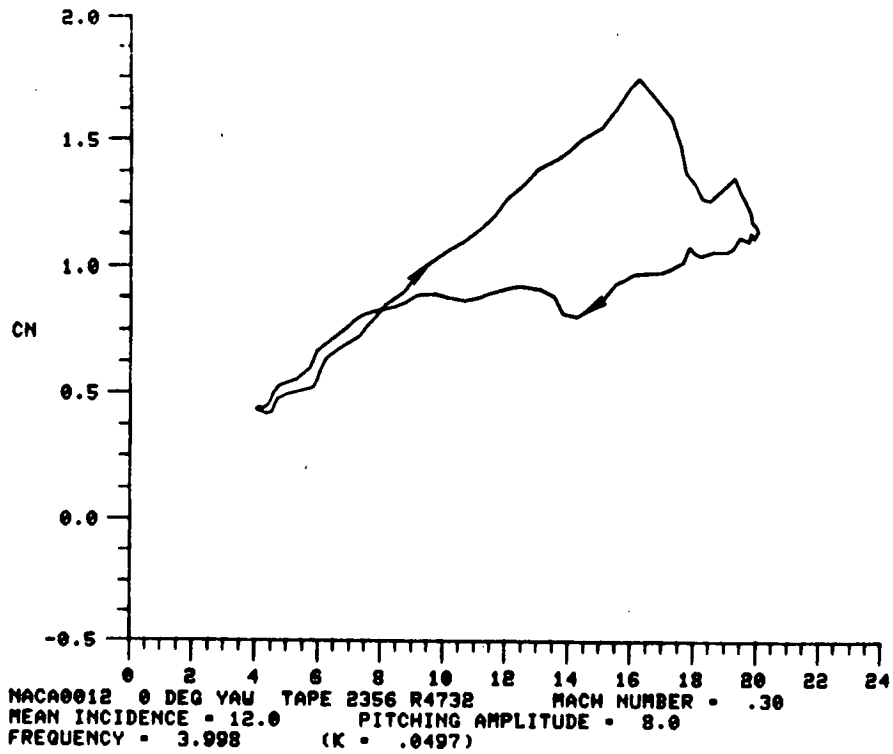
FILE 41. RUN 61.006



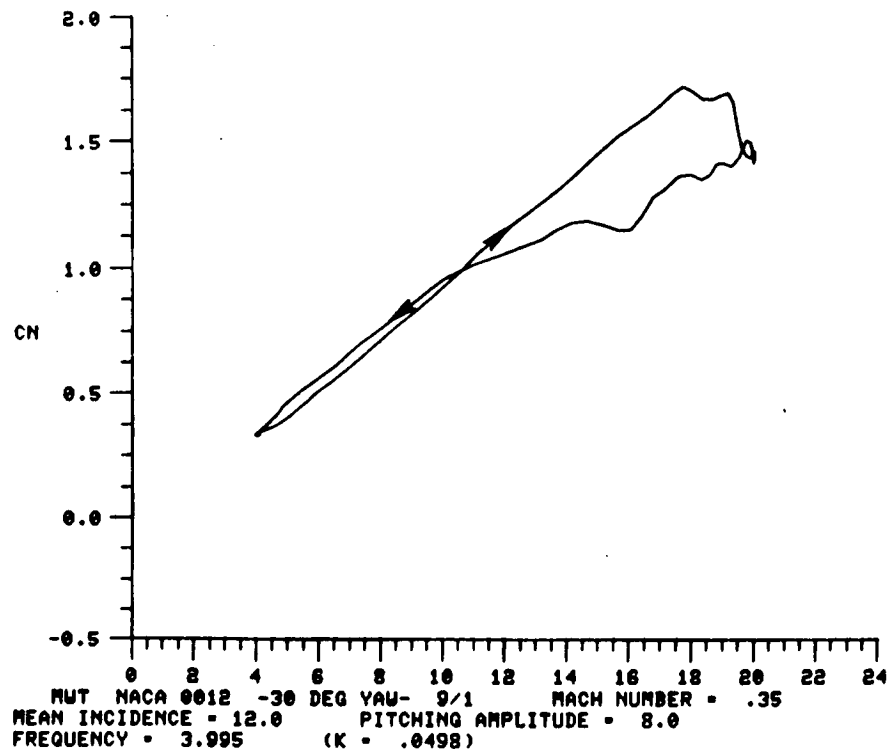
FILE 9. RUN1029.014



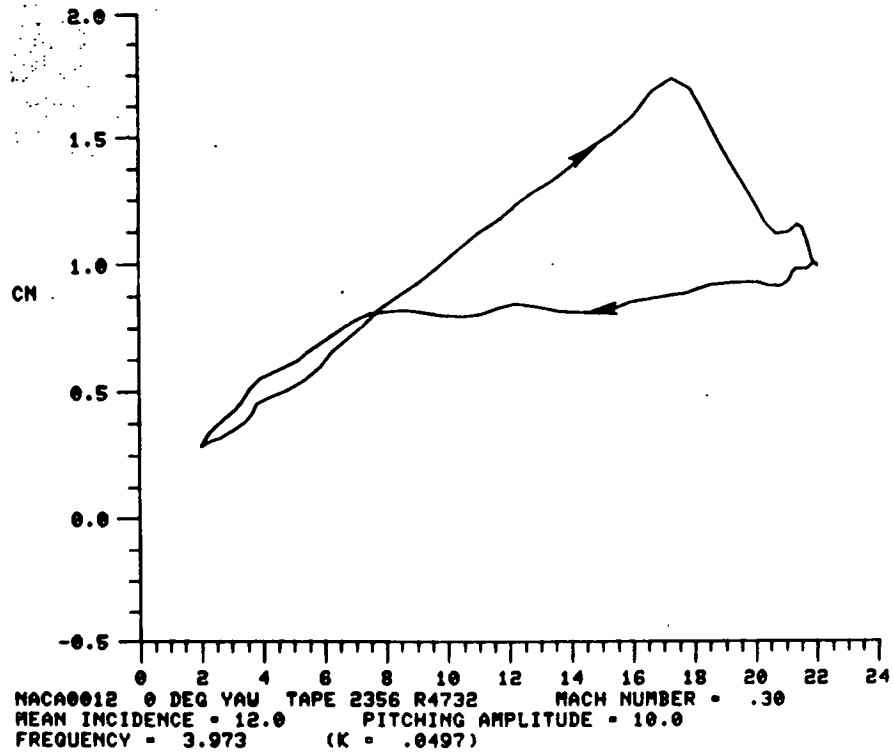
FILE 15. RUN 51.001



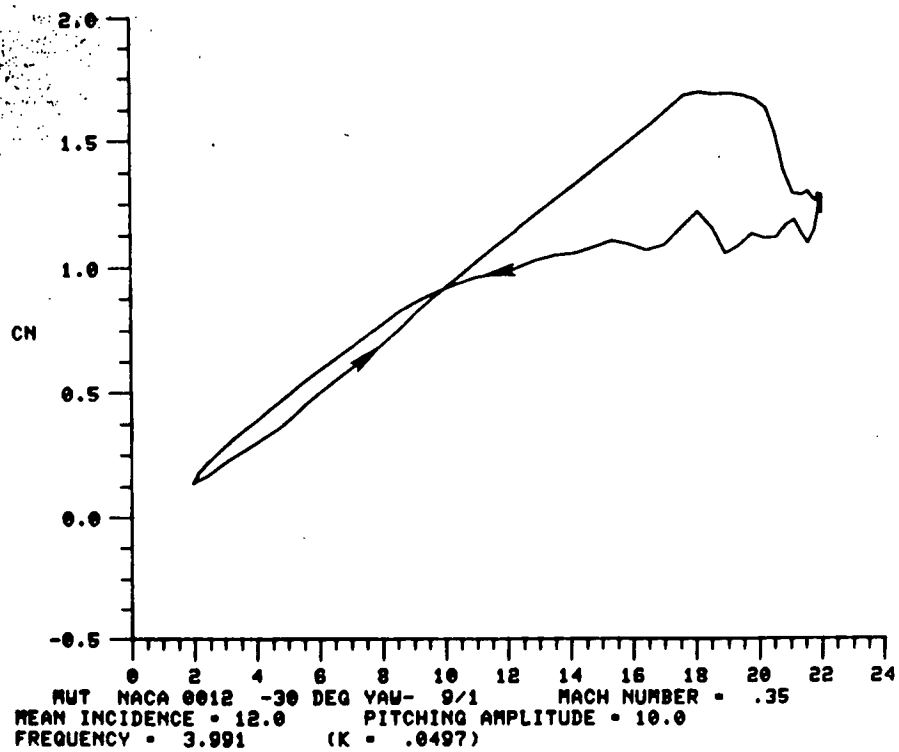
FILE 53. RUN1016.004



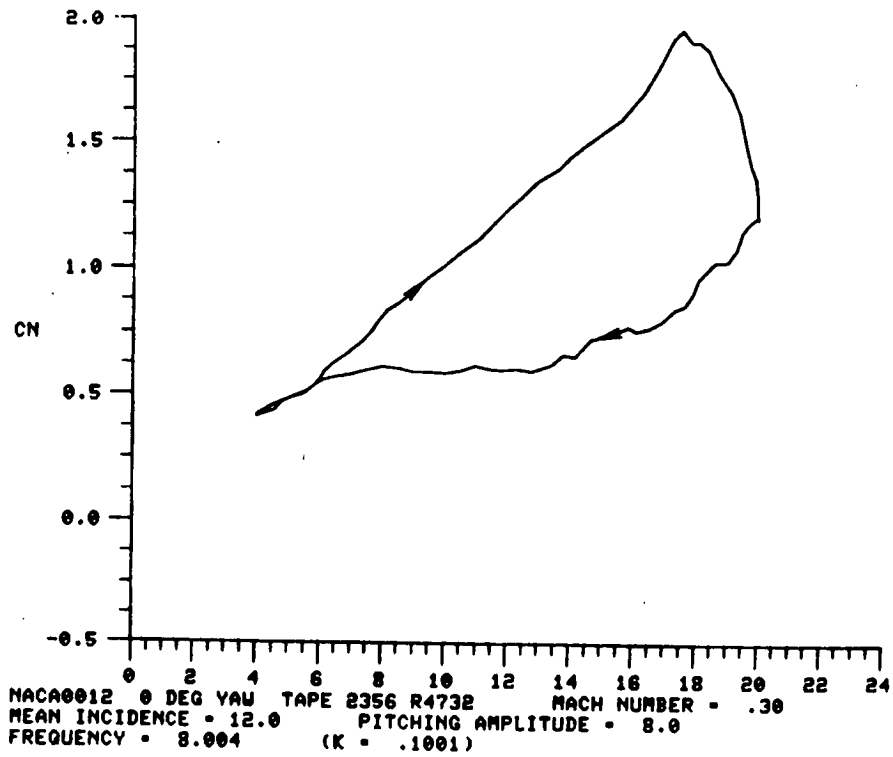
FILE 33. RUN 59.001



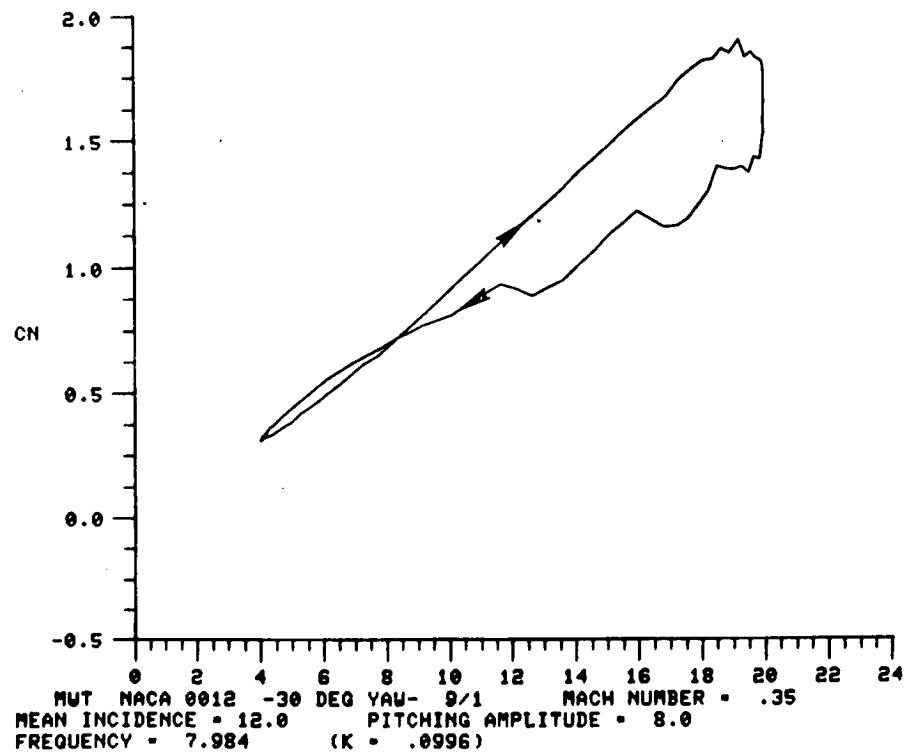
FILE 39. RUN1033.008



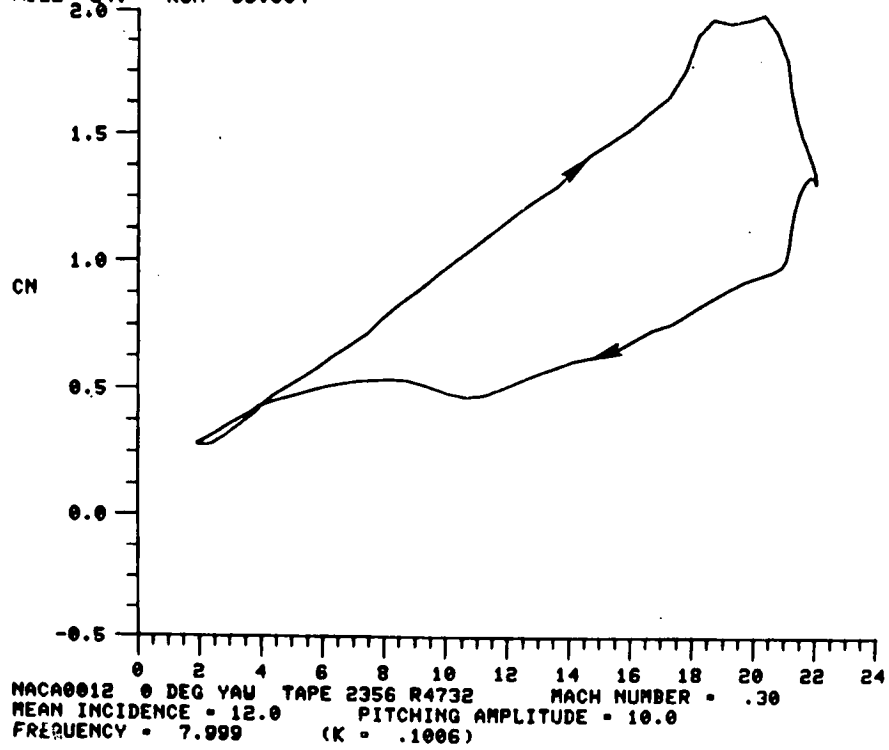
FILE 16. RUN 51.003



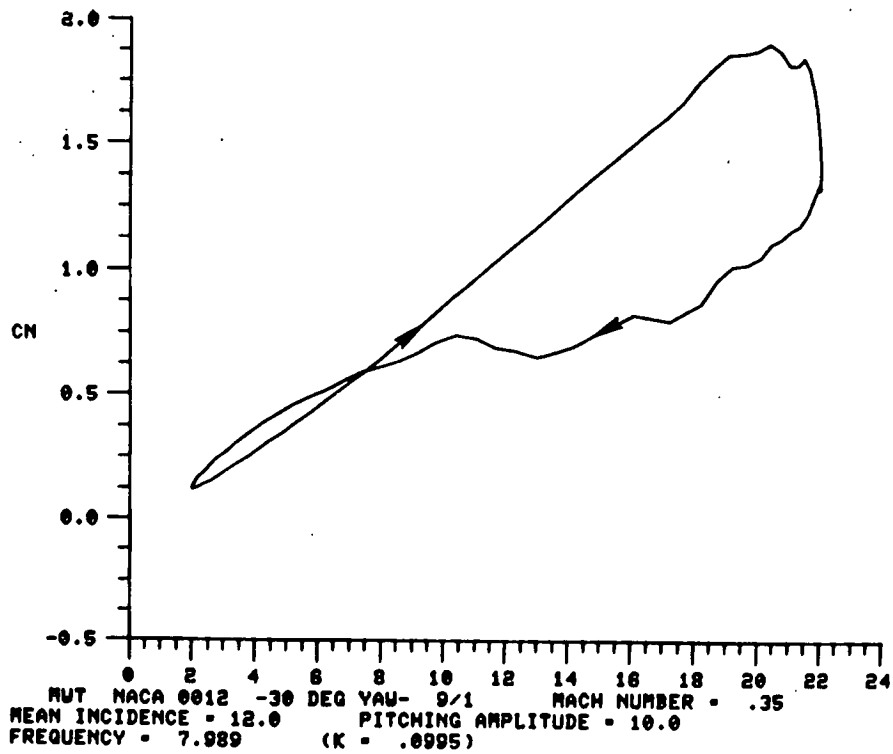
FILE 19. RUN1016.010



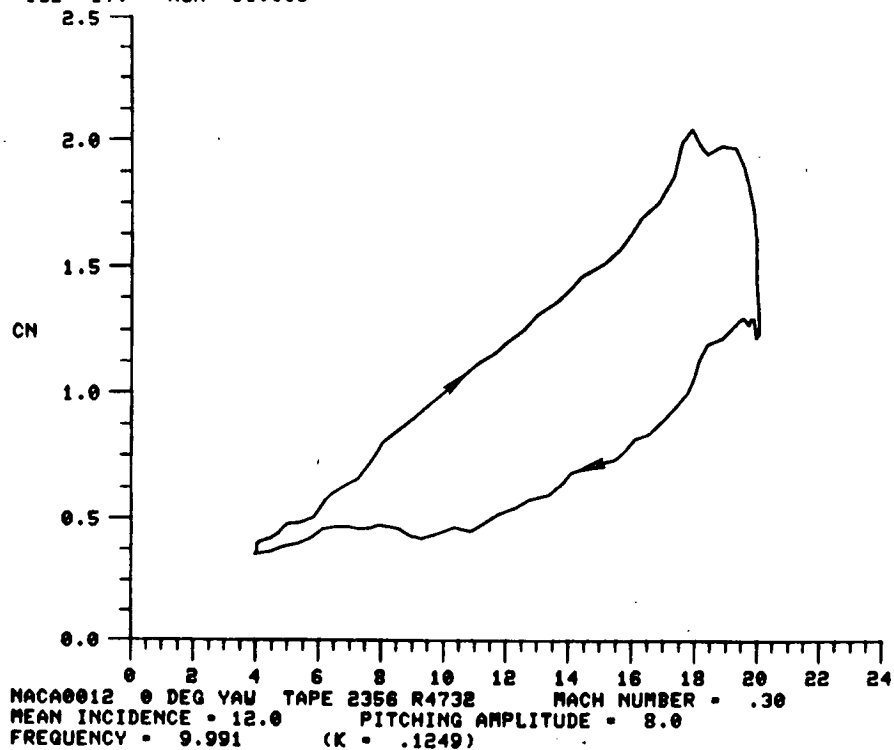
FILE 34. RUN 59.004



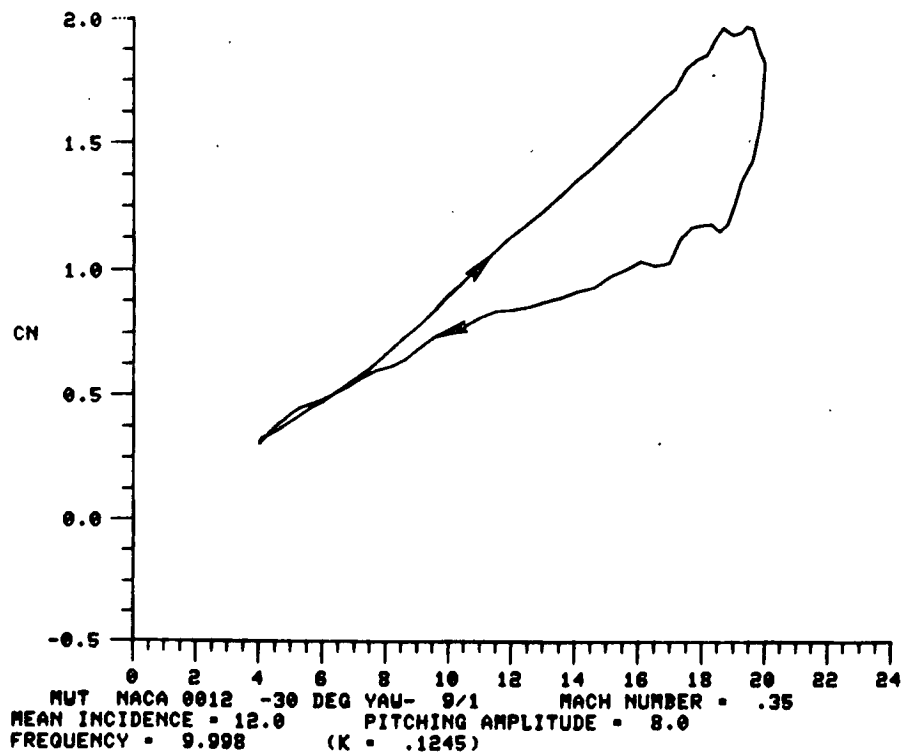
FILE 41. RUN1033.012



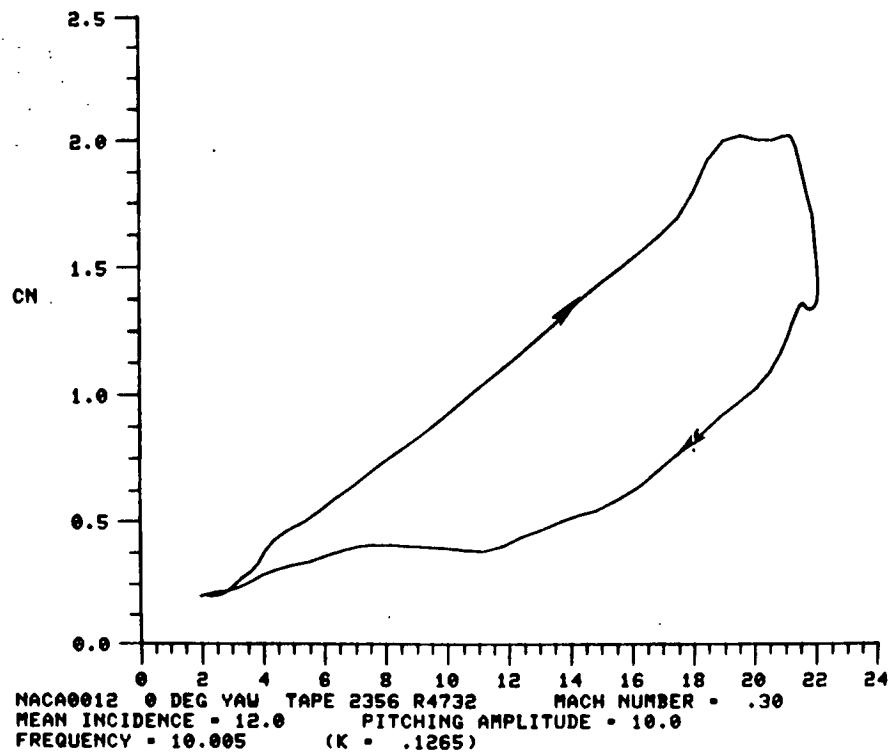
FILE 17. RUN 51.005



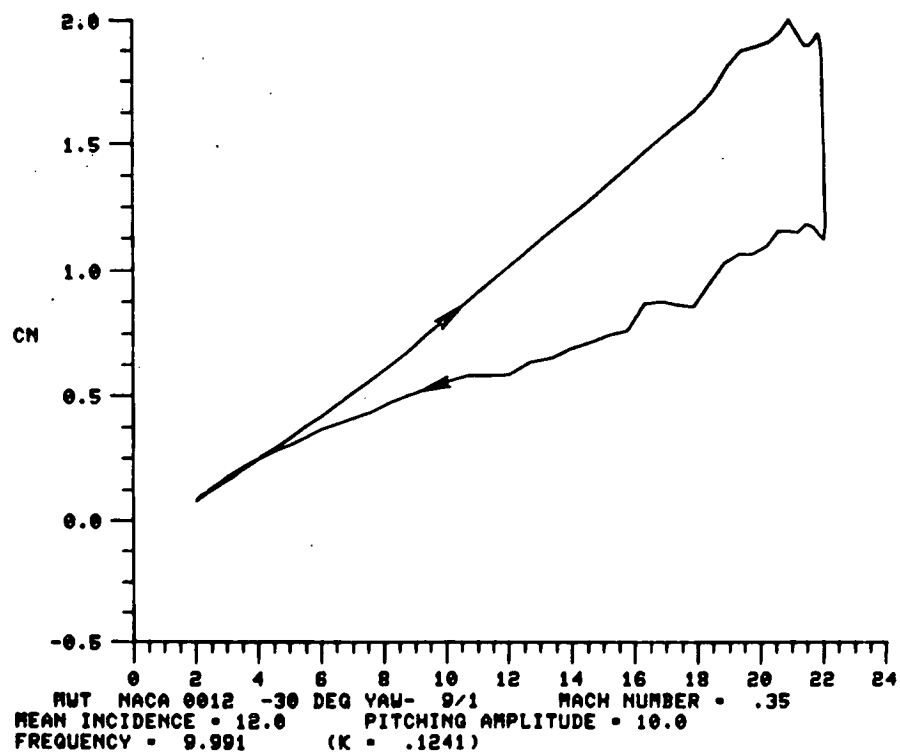
FILE 20. RUN3016.012



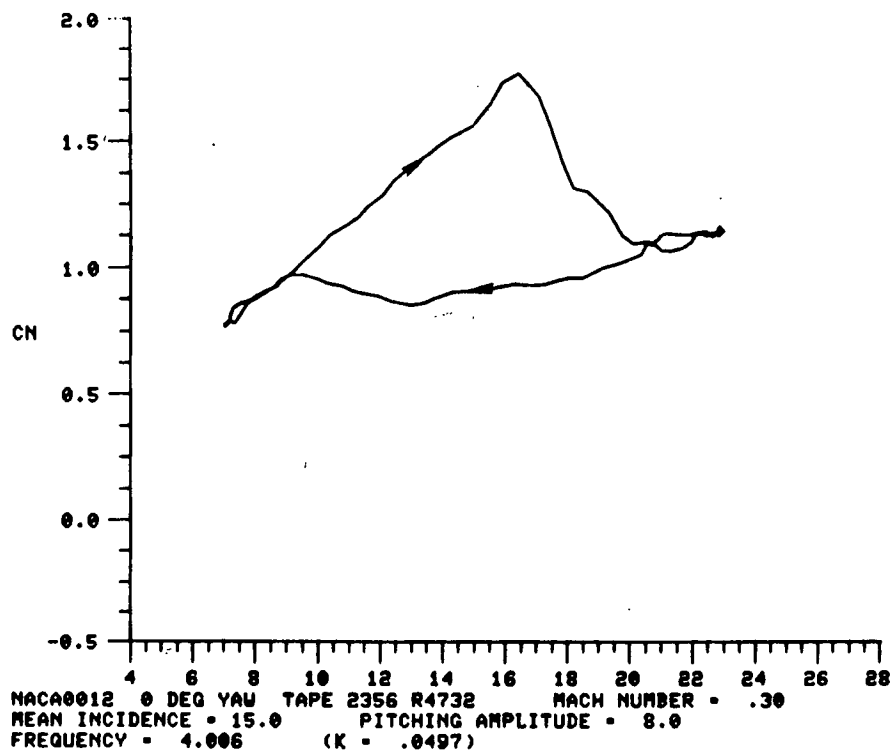
FILE 35. RUN 59.007



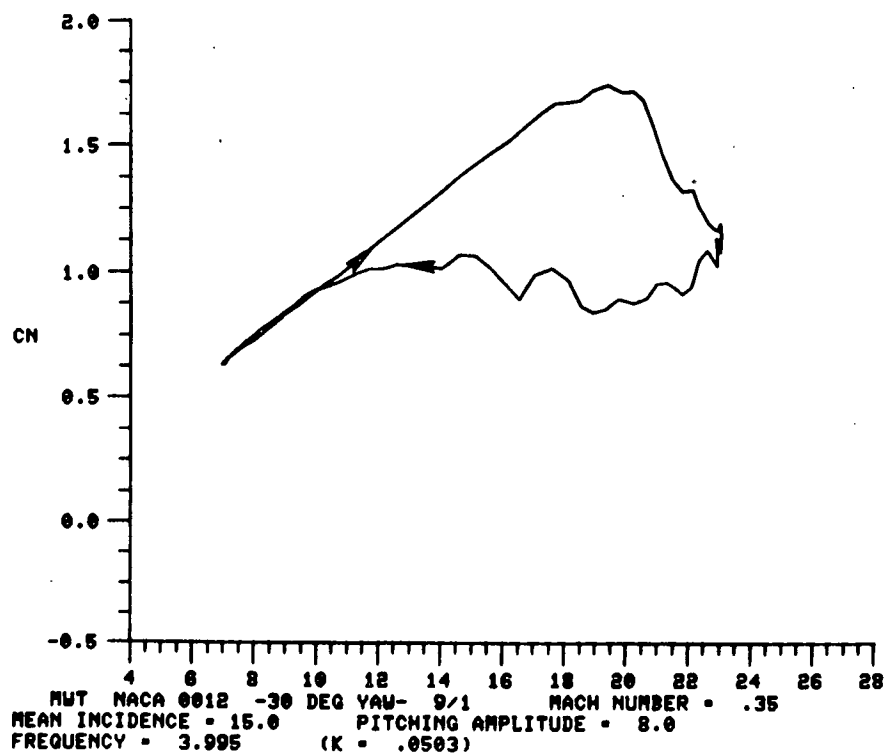
FILE 42. RUN1033.014



FILE 9. RUN 49.001

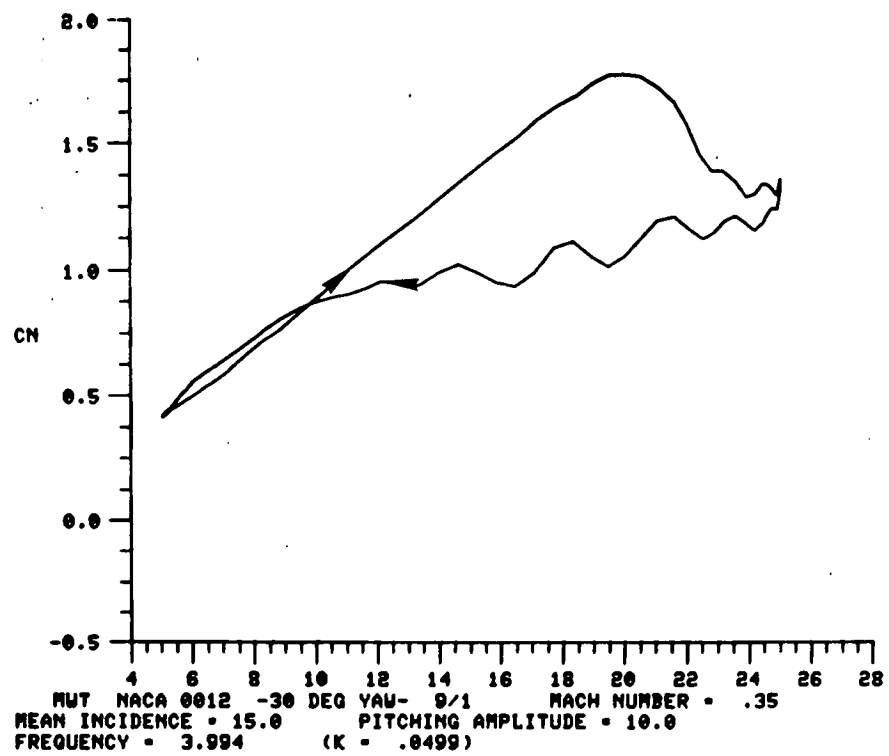


FILE 35. RUN1020.003

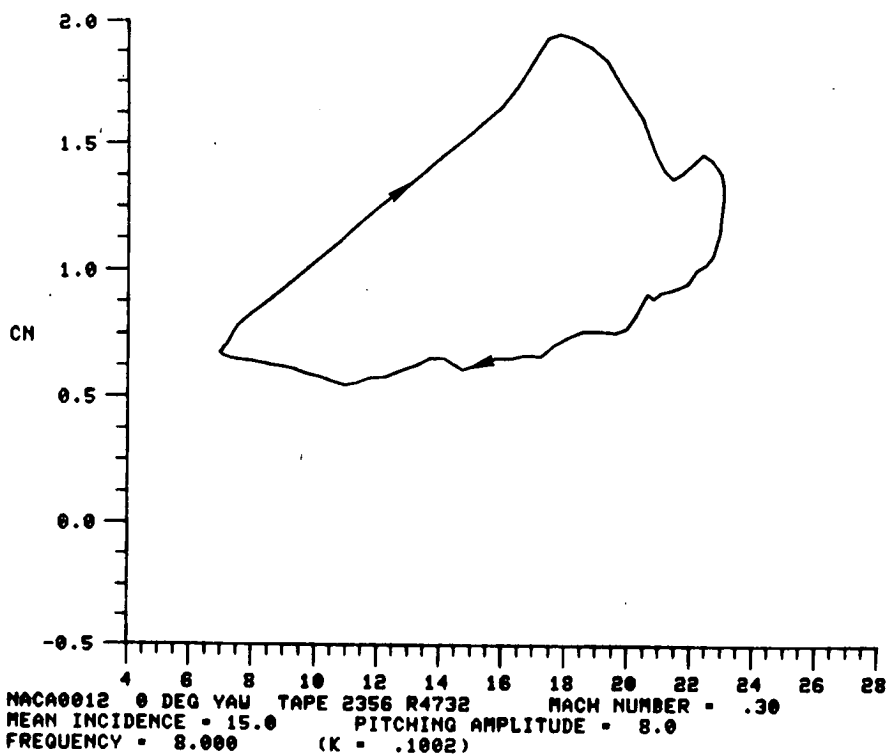


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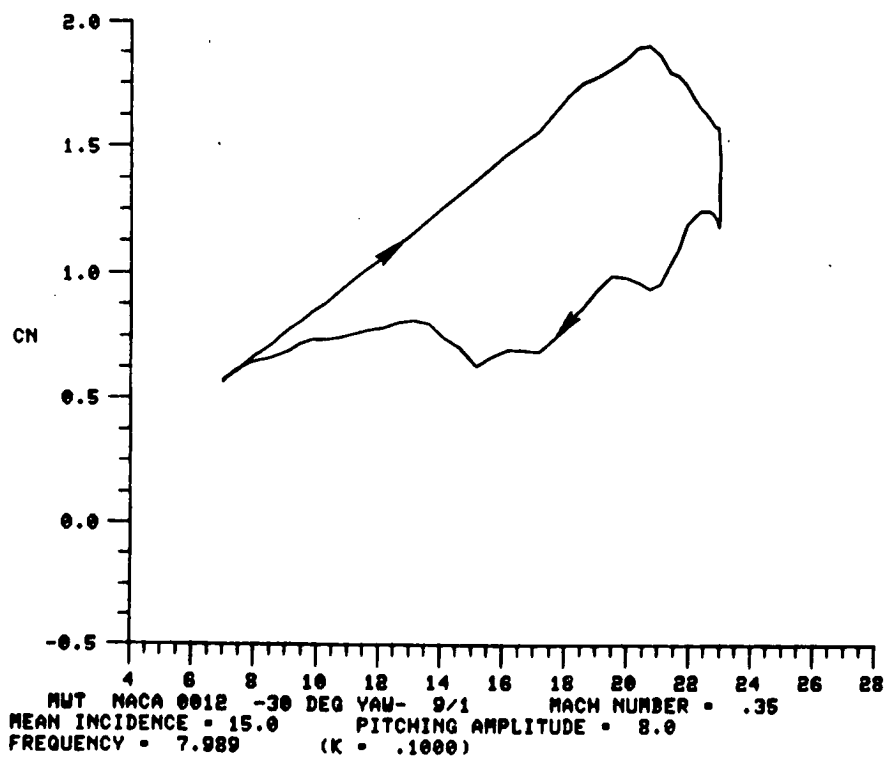
FILE 53. RUN1036.001



FILE 10. RUN 49.003

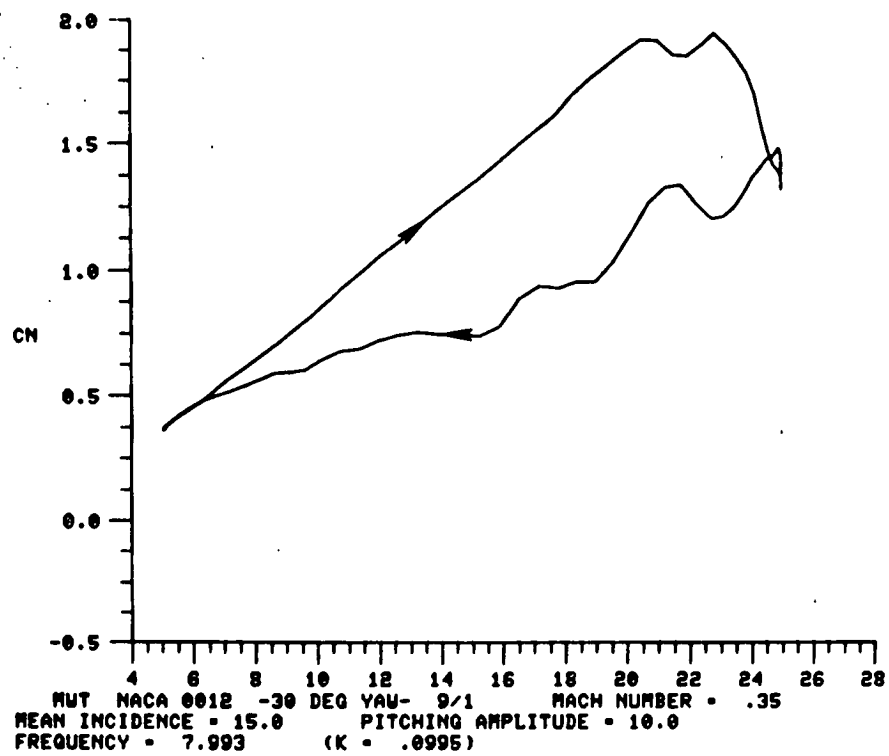


FILE 37. RUN1020.012

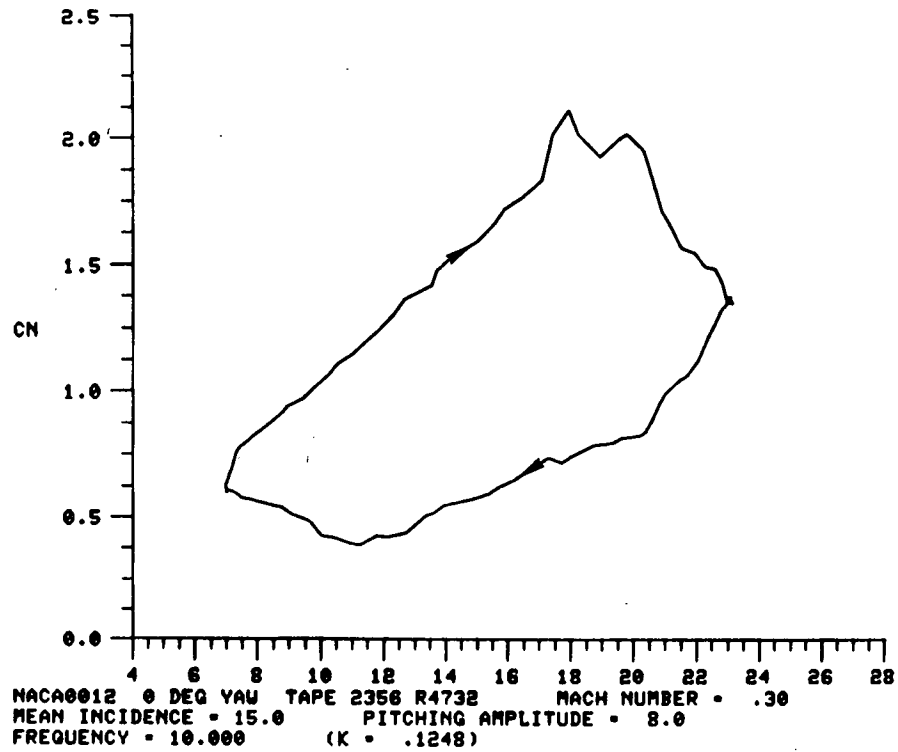


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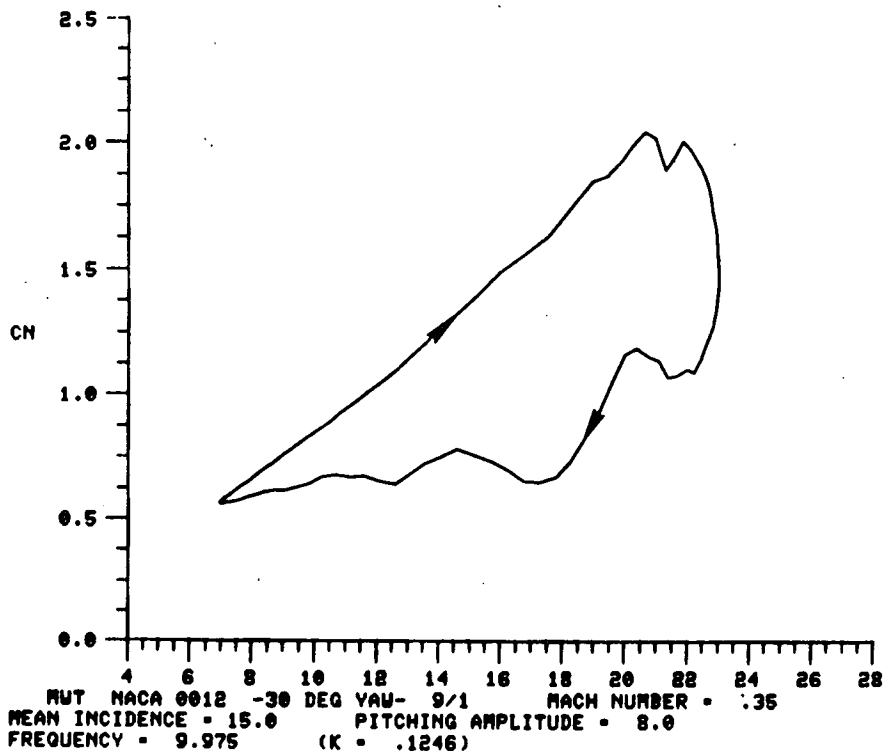
FILE 55. RUN1036.005



FILE 11. RUN 49.005

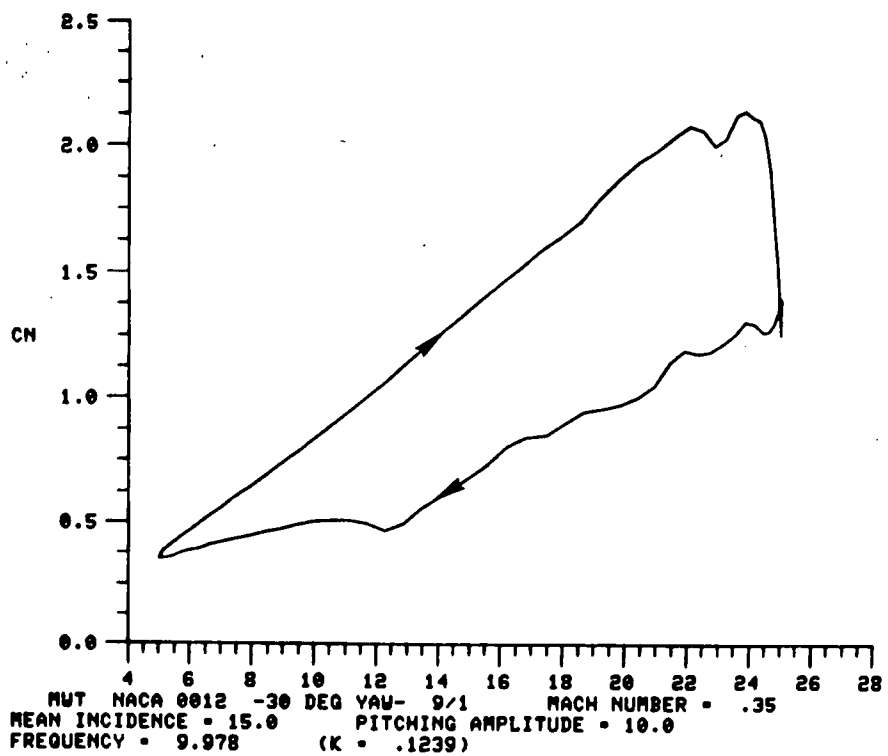


FILE 38. RUN1020.014

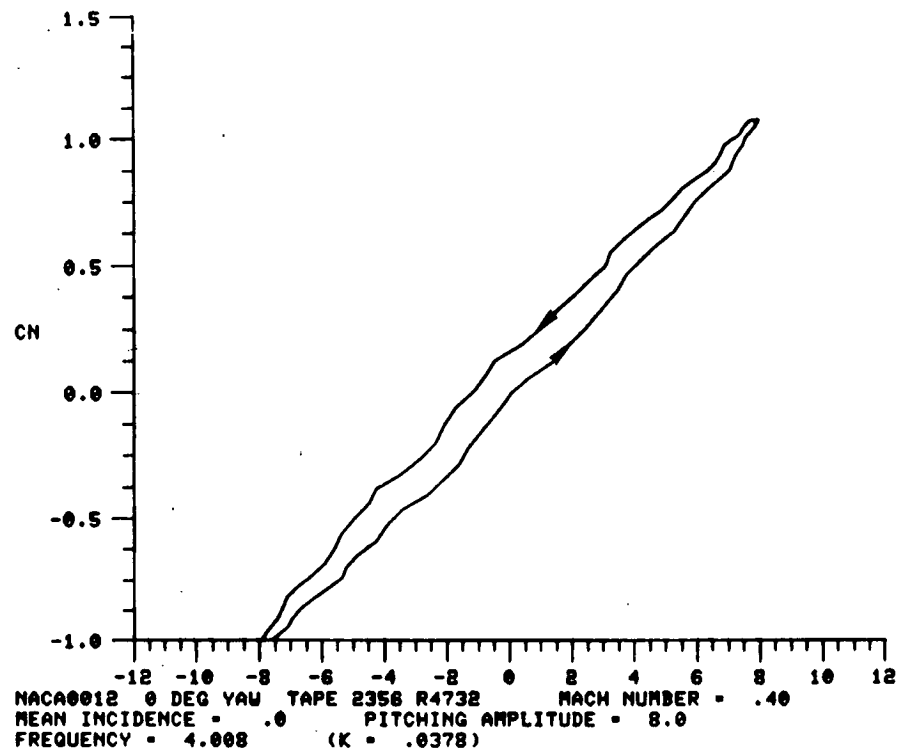


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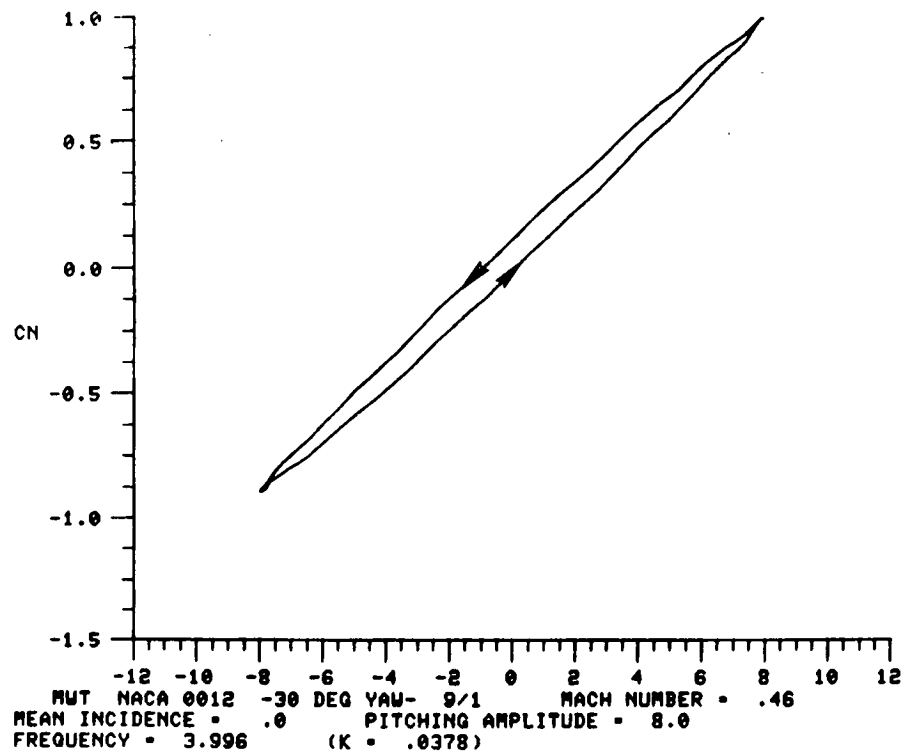
FILE 56. RUN1036.007



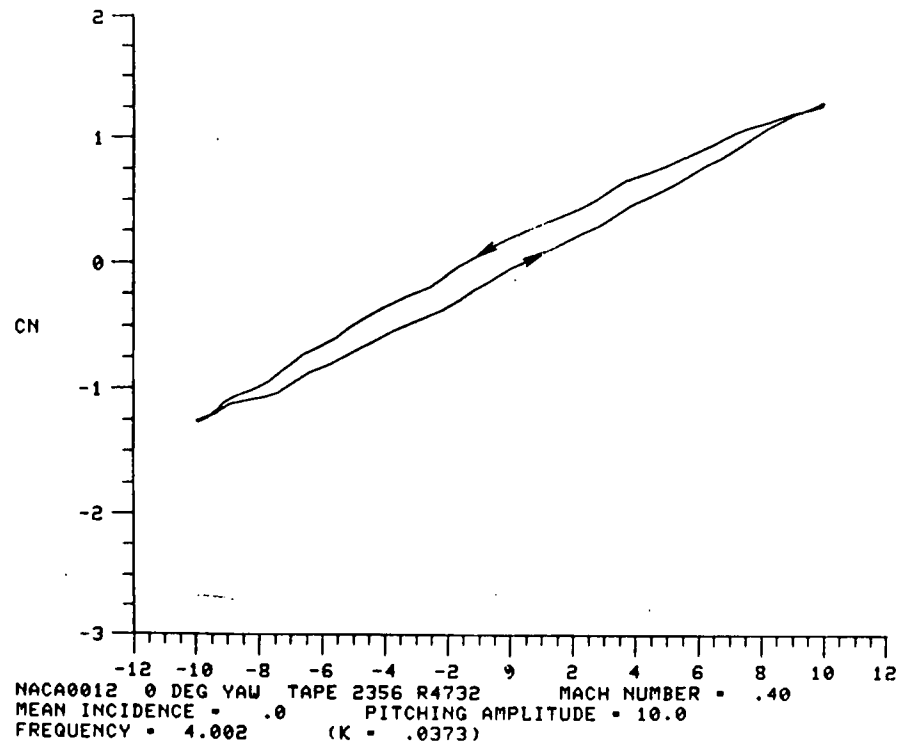
FILE 24. RUN 54.001



FILE 12. RUN1008.001

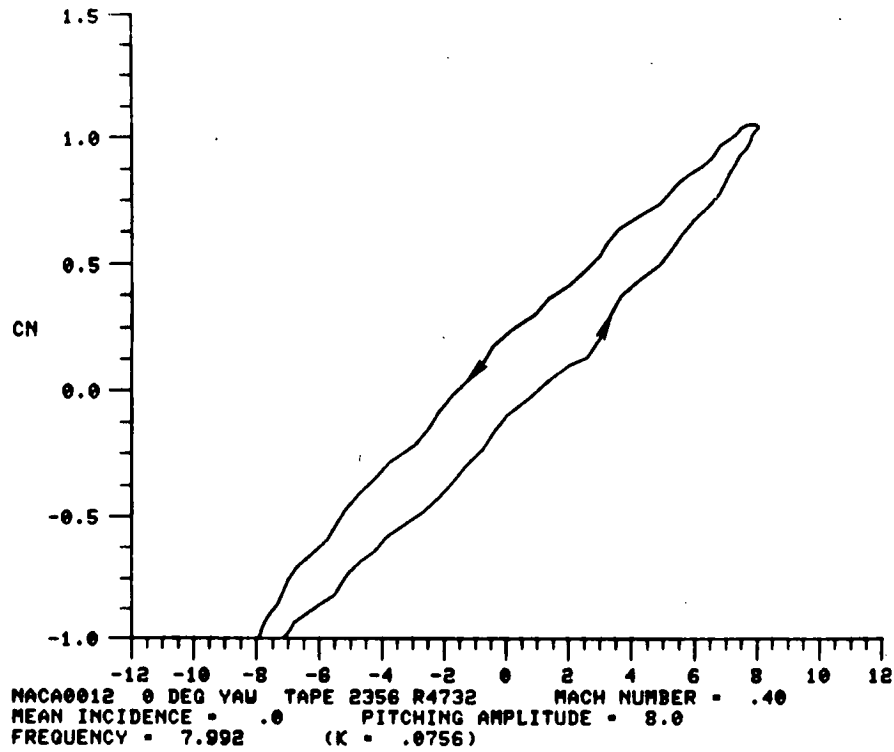


FILE 30. RUN 58.001

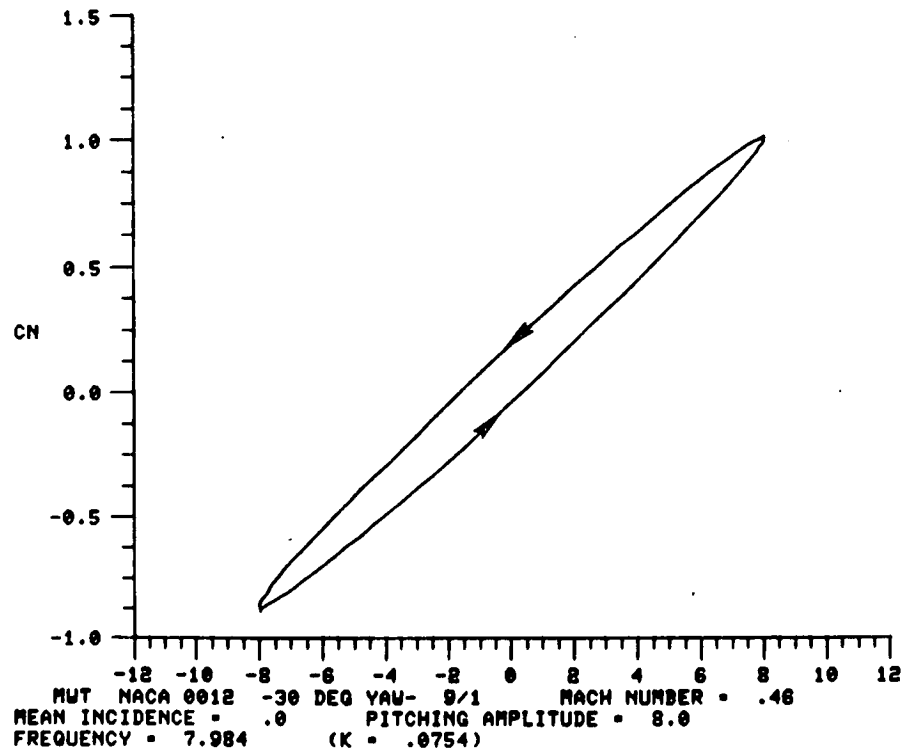


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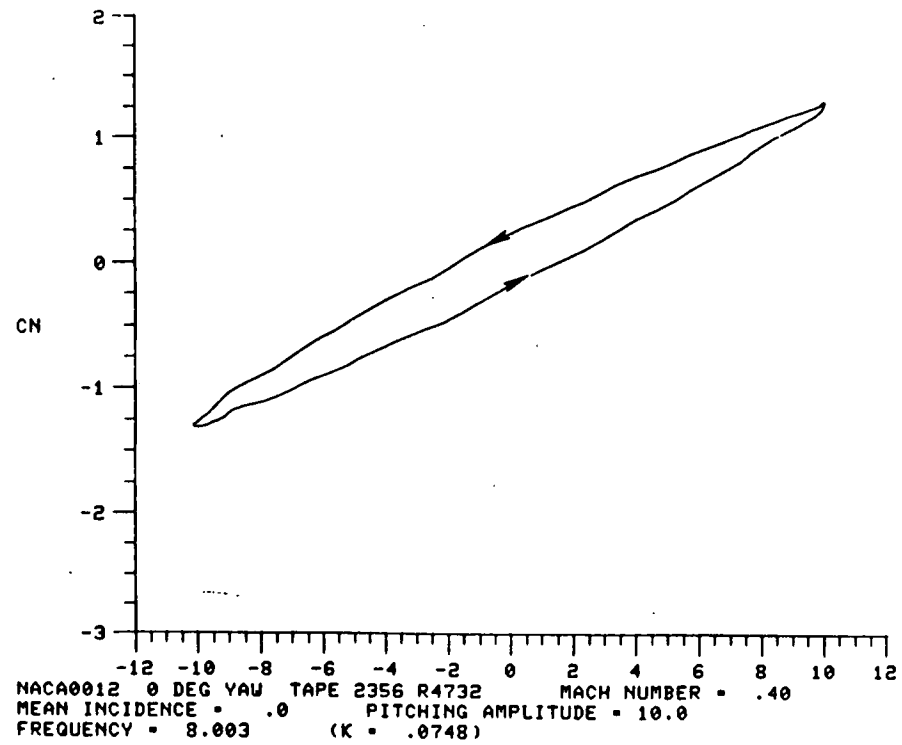
FILE 25. RUN 54.003



FILE 14. RUN1008.005

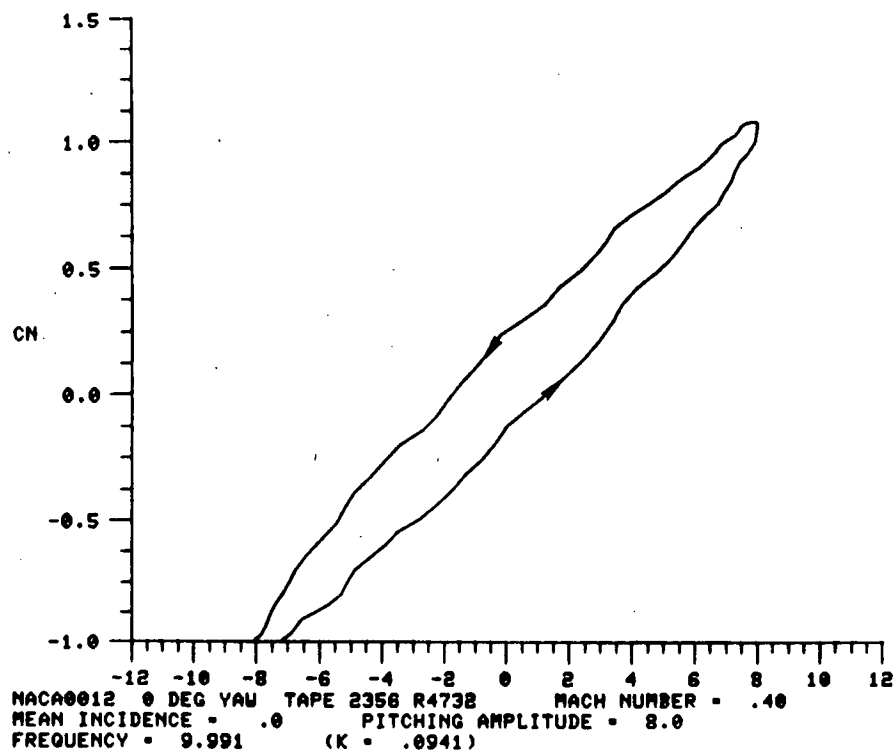


FILE 31. RUN 58.003

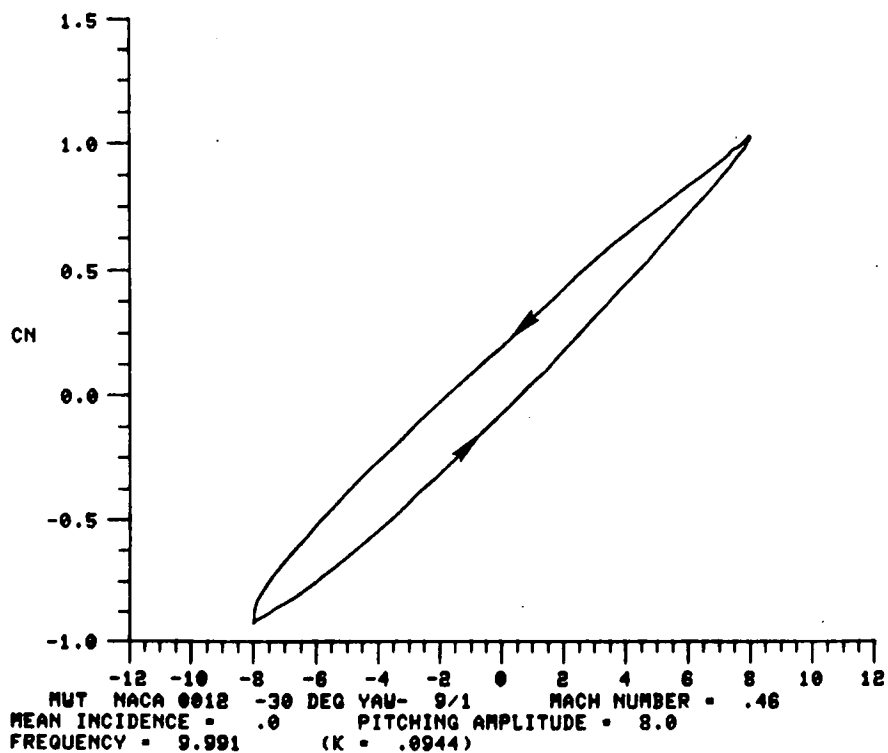


DATA WERE NOT OBTAINED

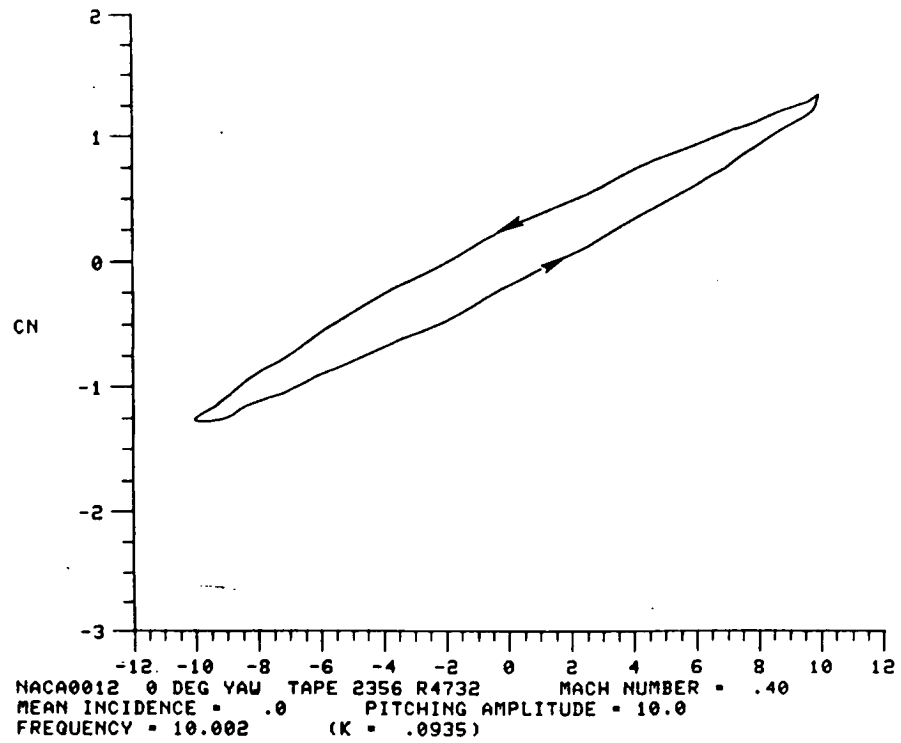
FILE 26. RUN 54.005



FILE 48. RUN1008.007

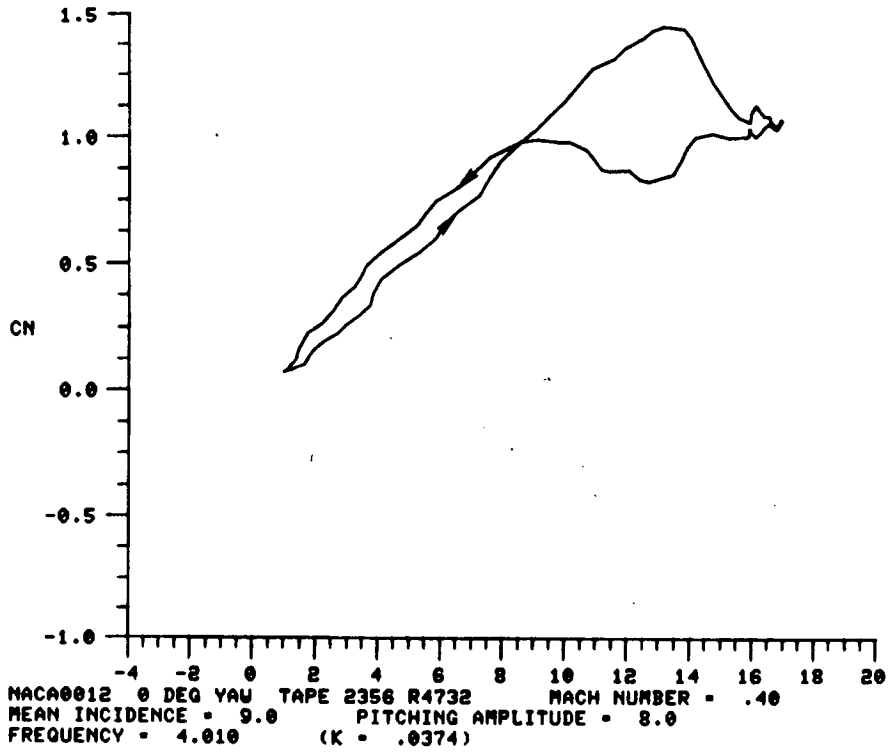


FILE 32. RUN 58.005

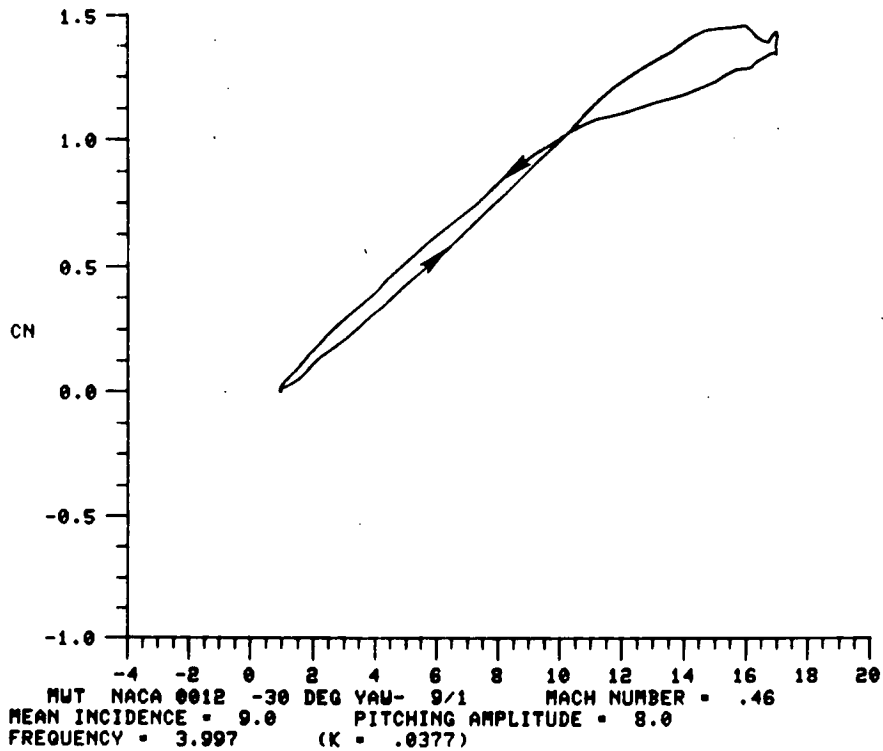


DATA WERE NOT OBTAINED

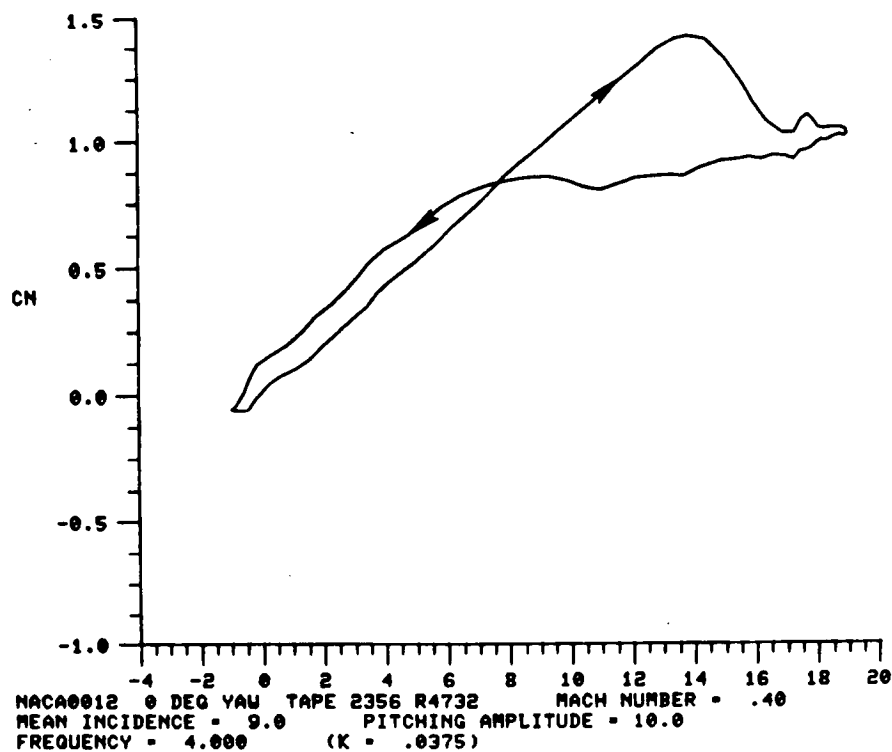
FILE 6. RUN 48.001



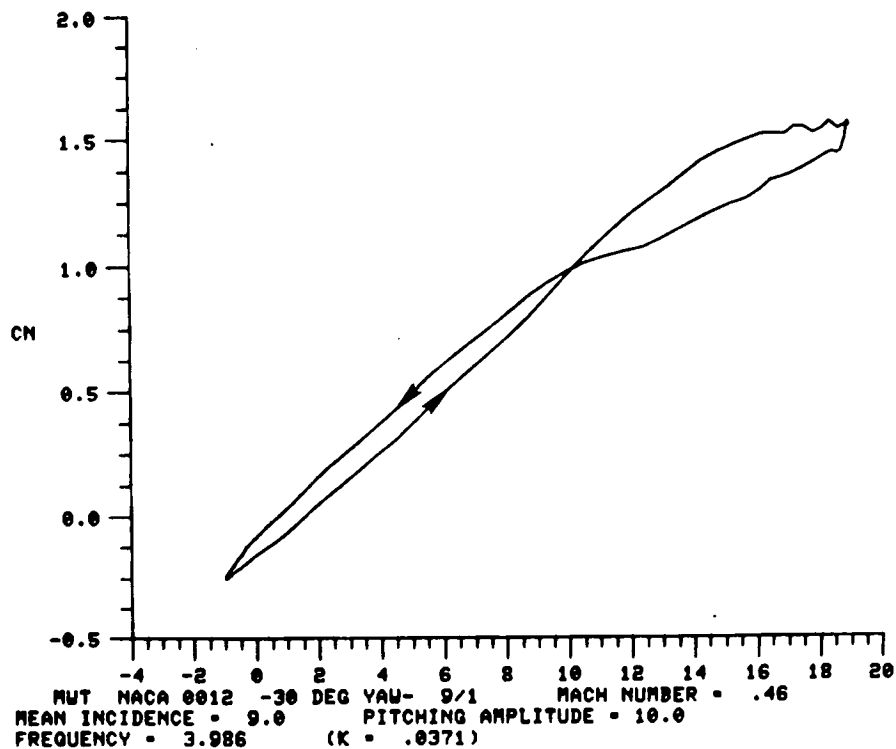
FILE 30. RUN1019.001



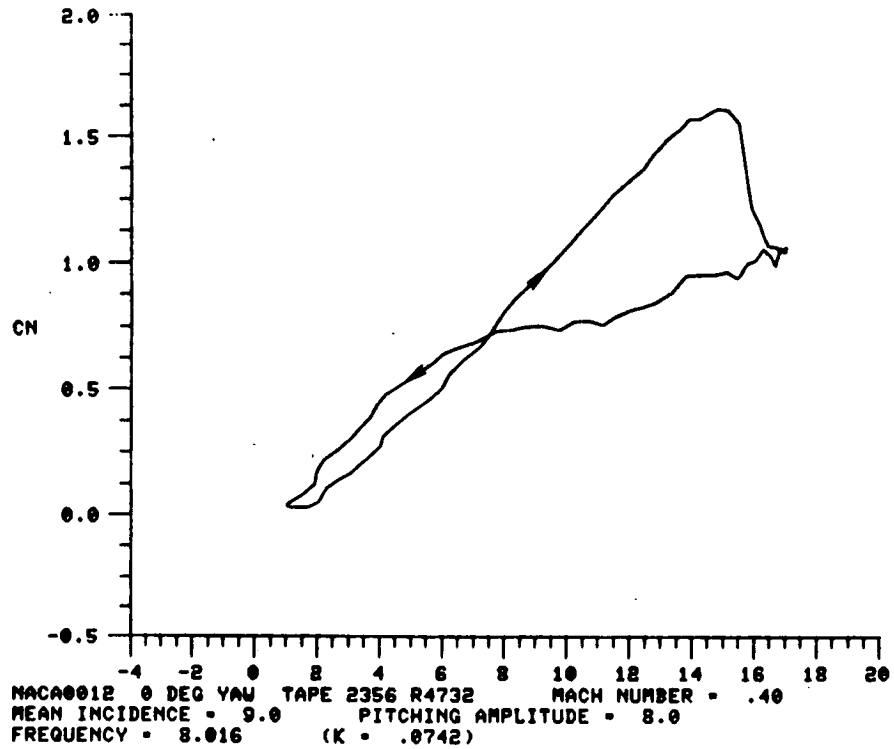
FILE 48. RUN 62.002



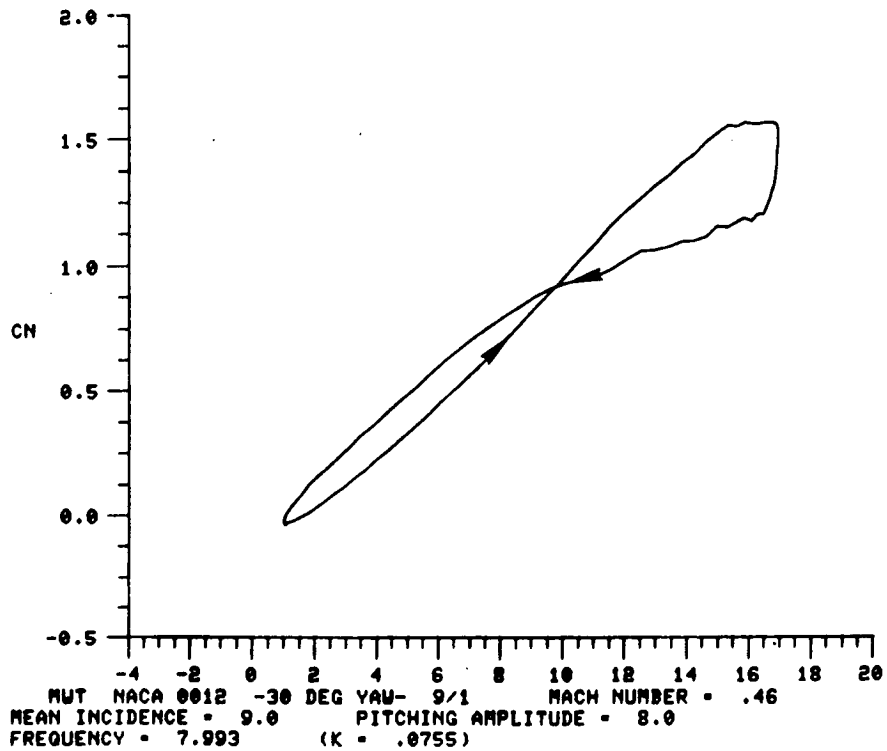
FILE 10. RUN3030.001



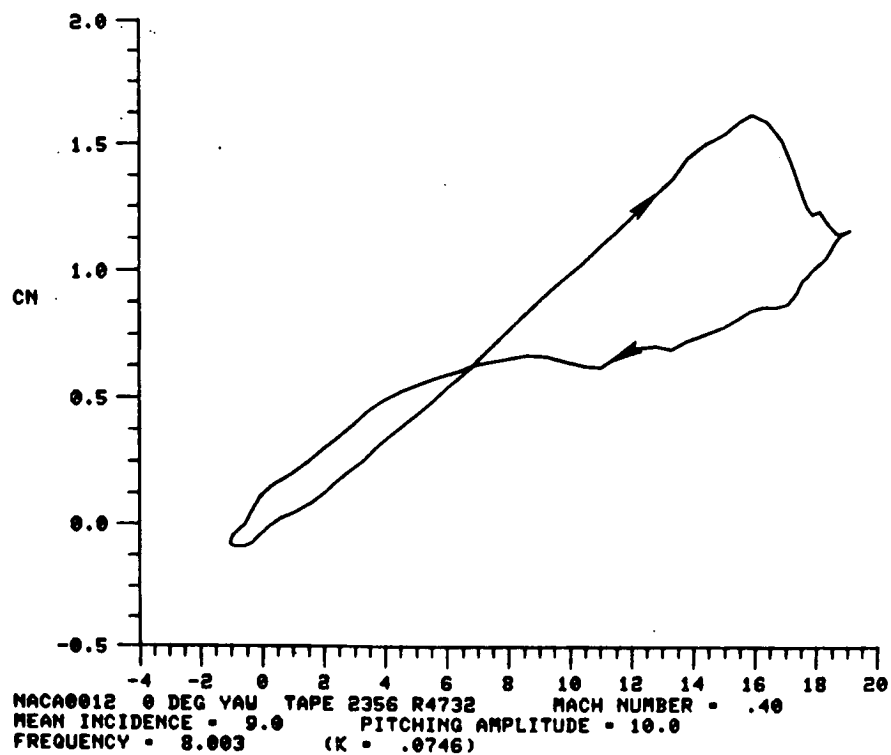
FILE 7. RUN 48.003



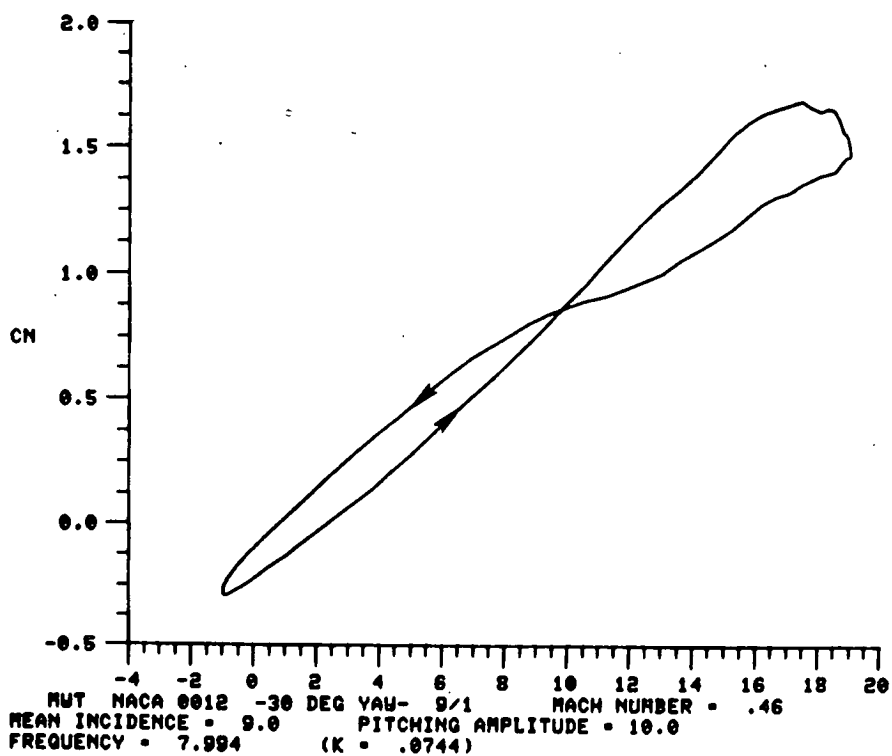
FILE 32. RUN1019.005



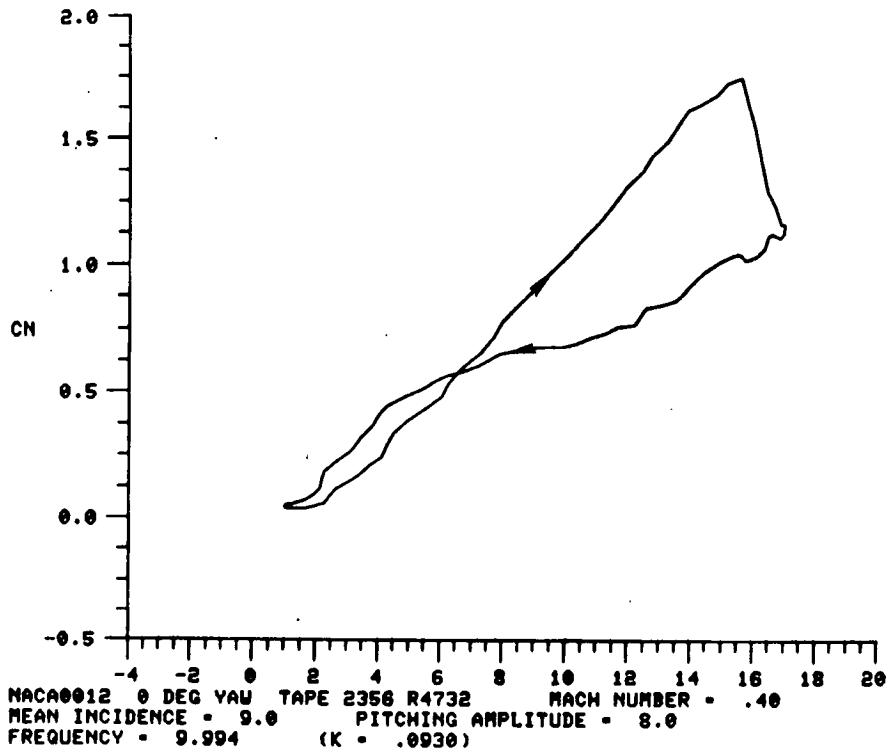
FILE 43. RUN 62.004



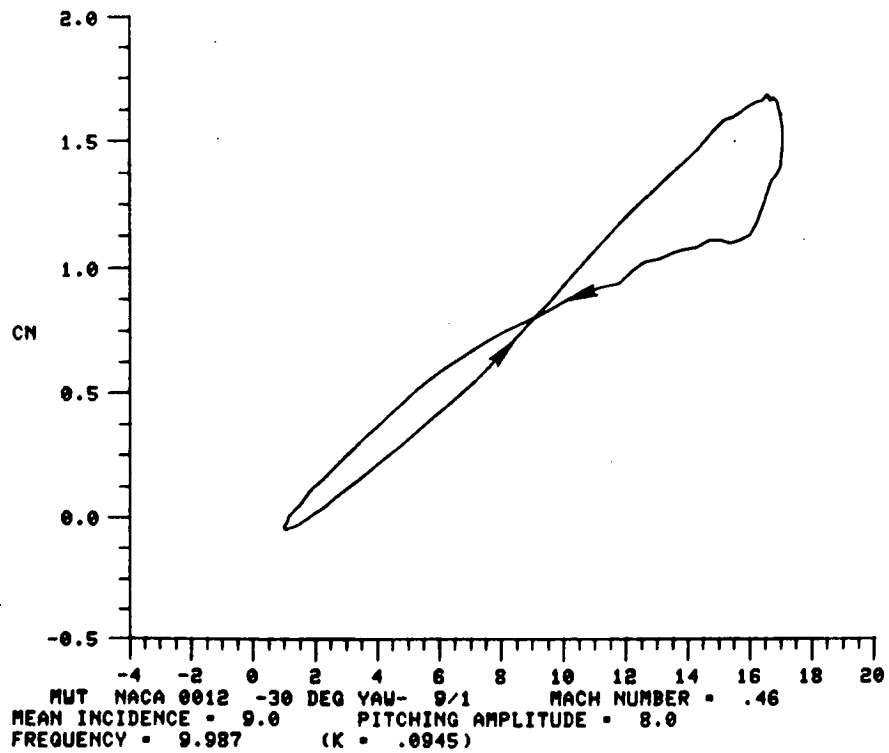
FILE 12. RUN1030.005



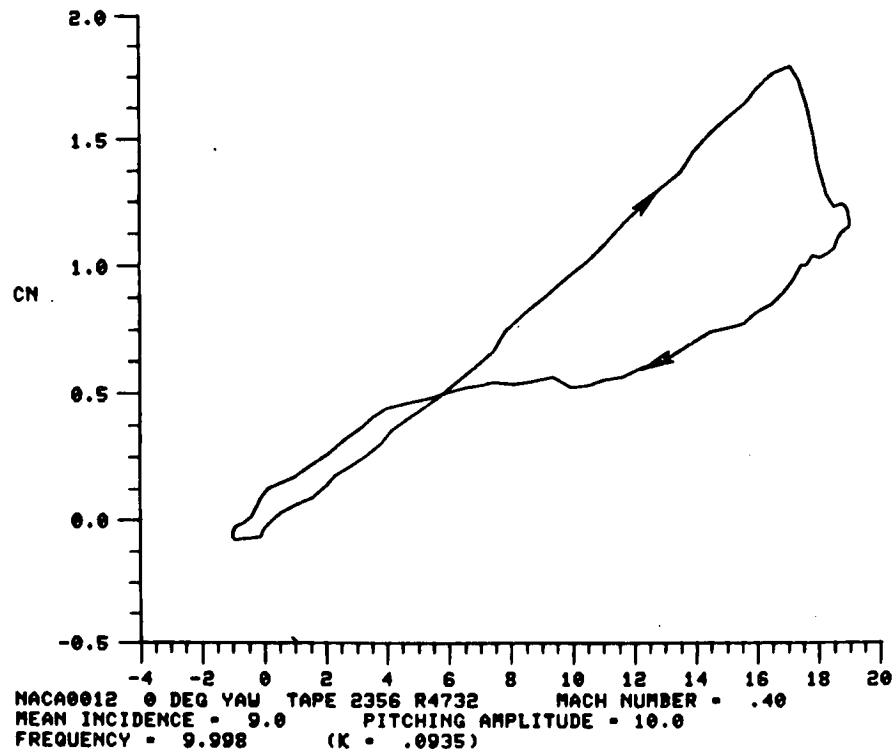
FILE 8. RUN 48.005



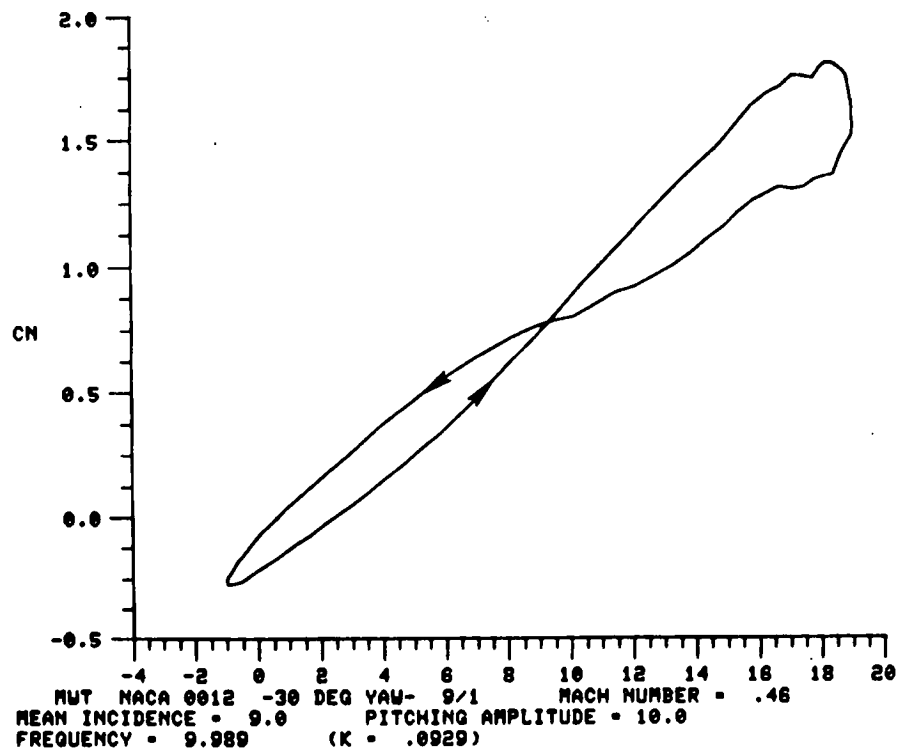
FILE 33. RUN1019.007



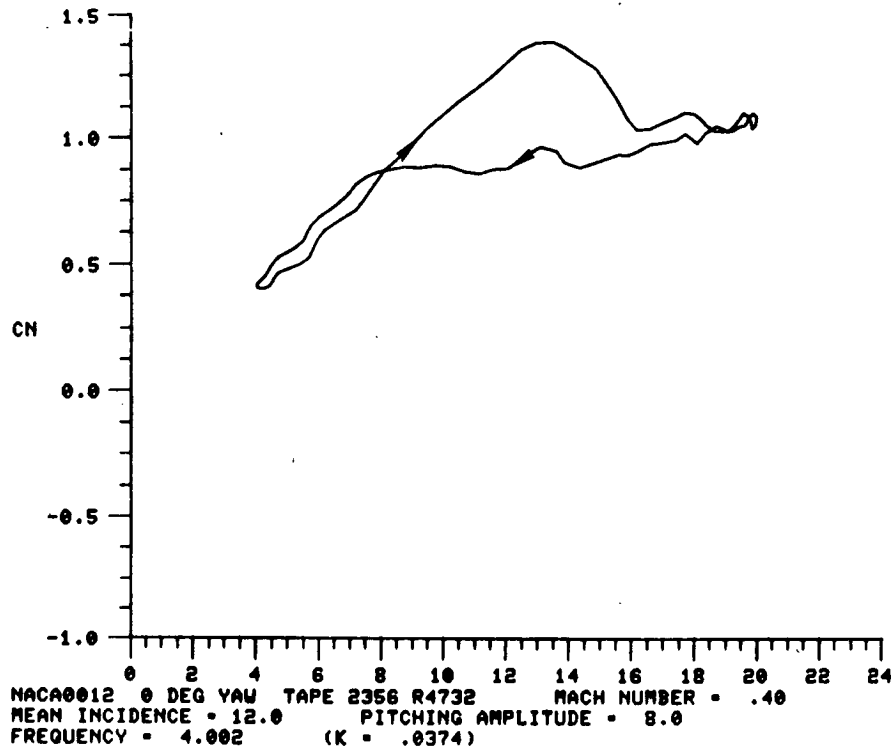
FILE 44. RUN 62.006



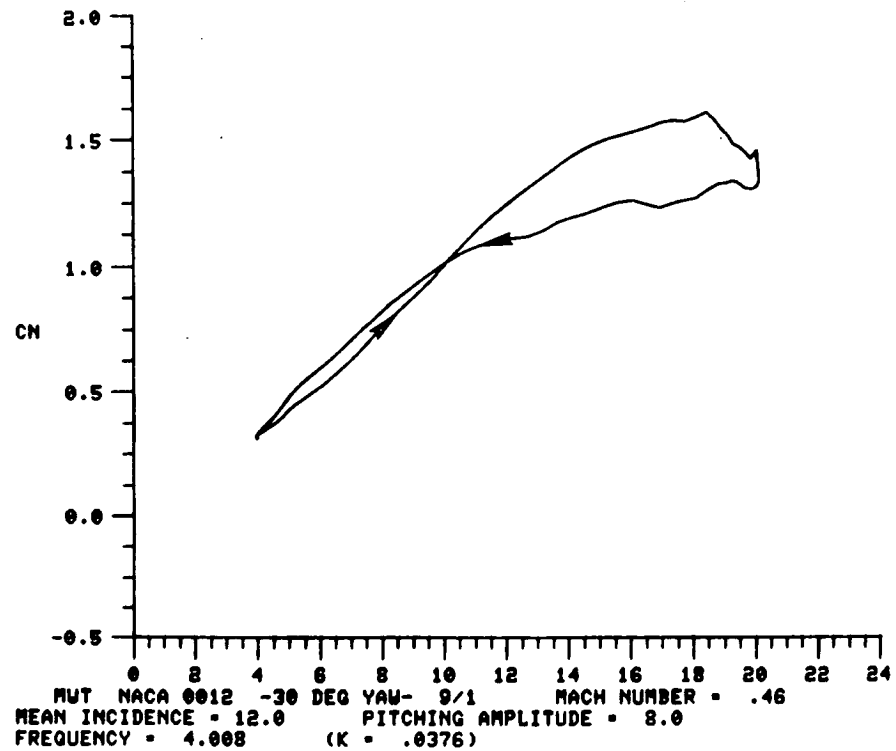
FILE 13. RUN1030.007



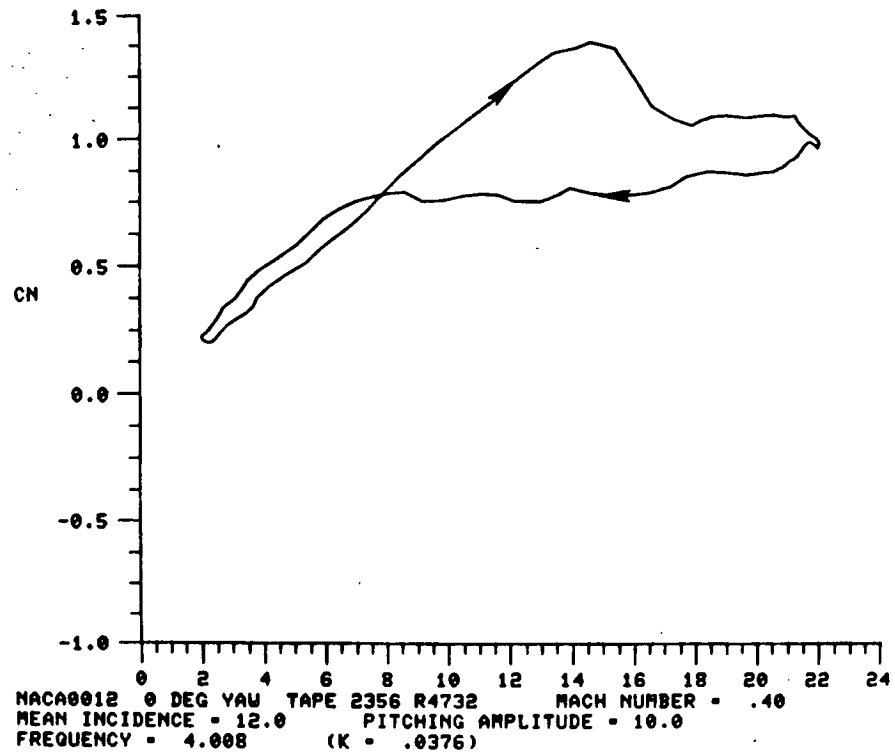
FILE 18. RUN 52.001



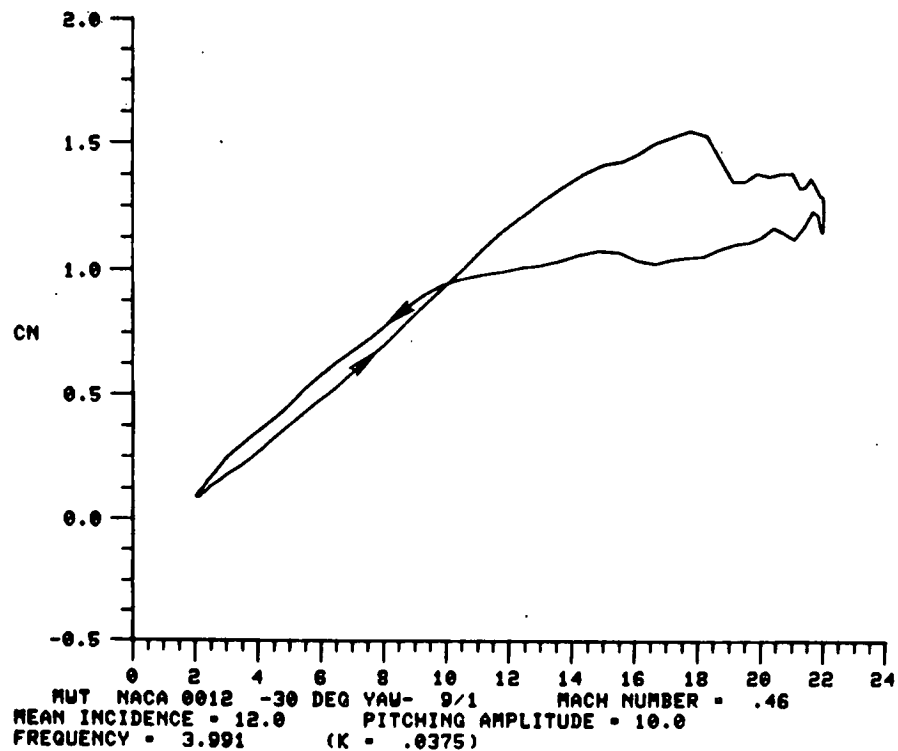
FILE 55. RUN1017.001



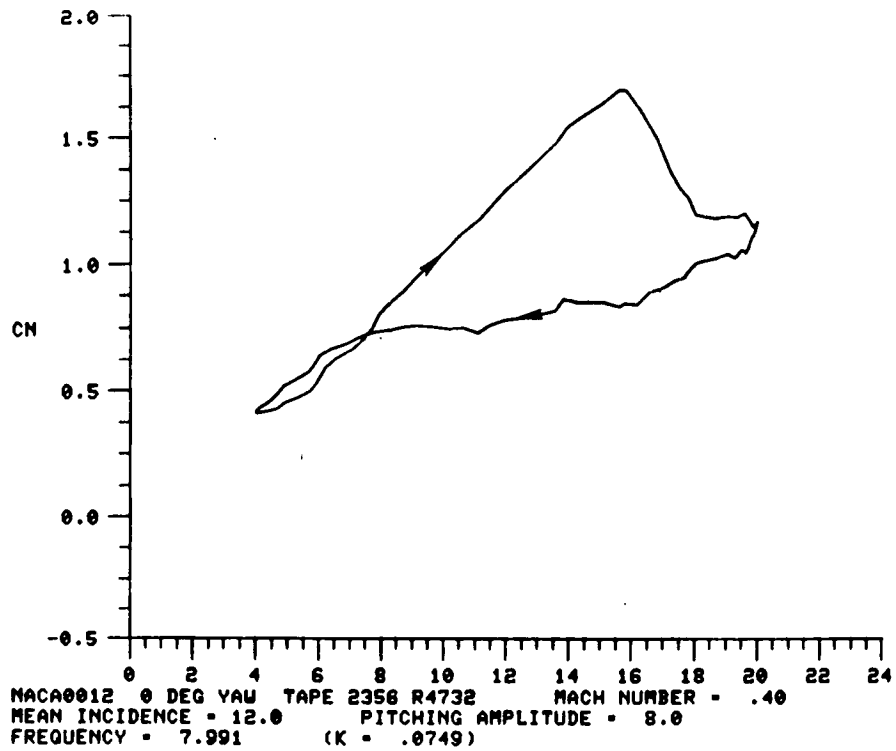
FILE 36. RUN 60.001



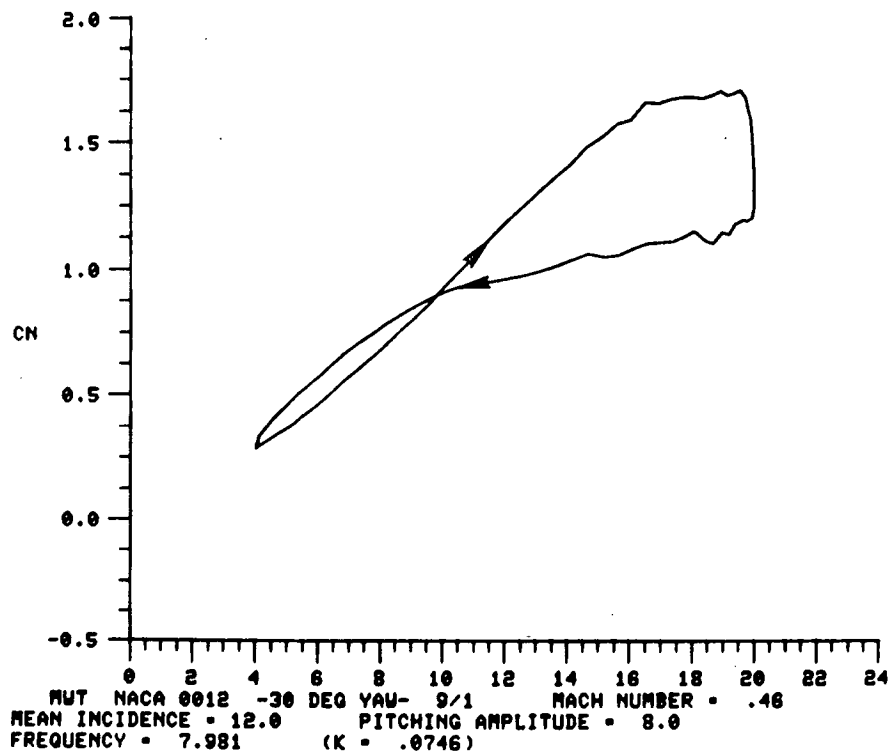
FILE 43. RUN1034.001



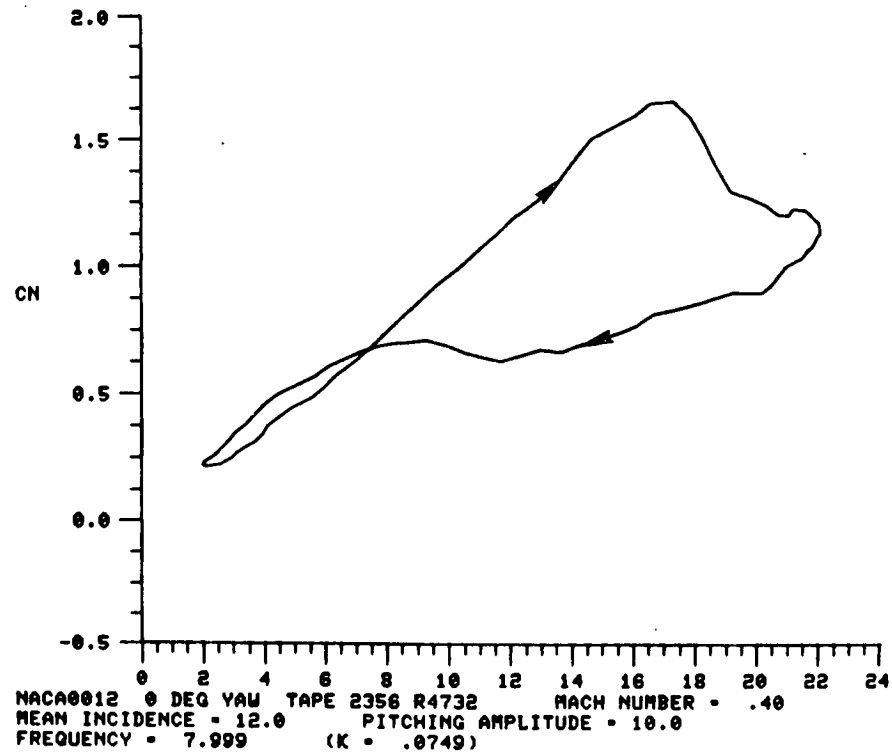
FILE 19. RUN 52.003



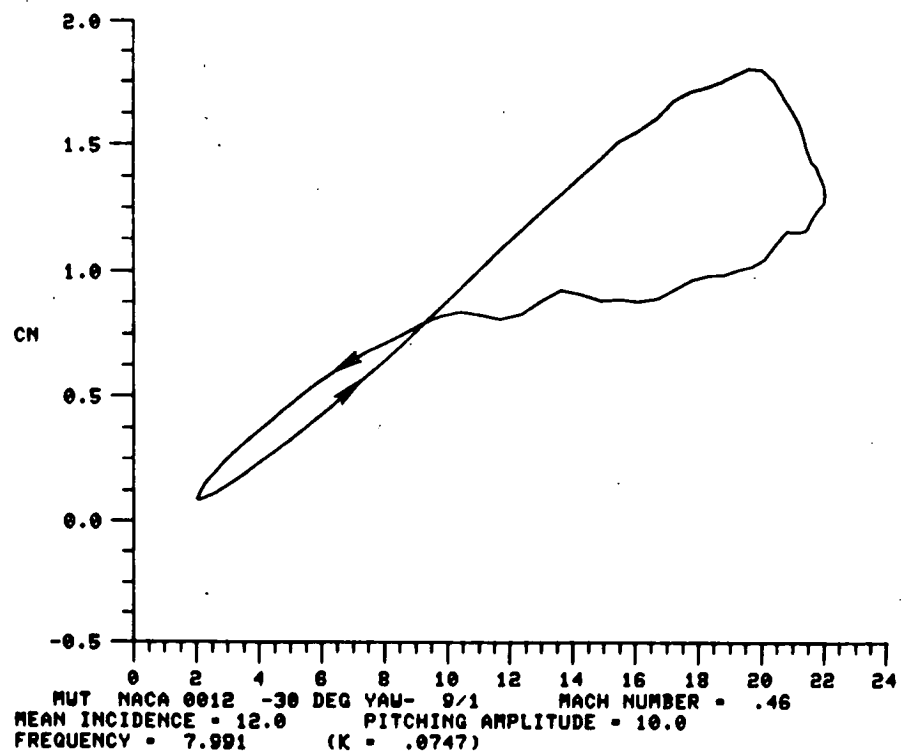
FILE 57. RUN1017.005



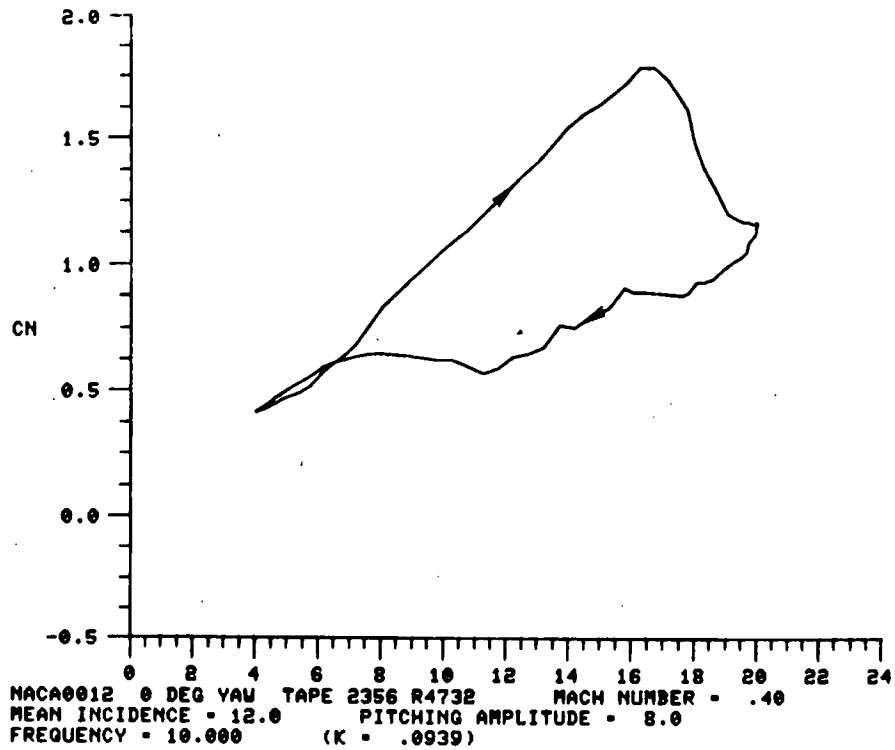
FILE 37. RUN 60.003



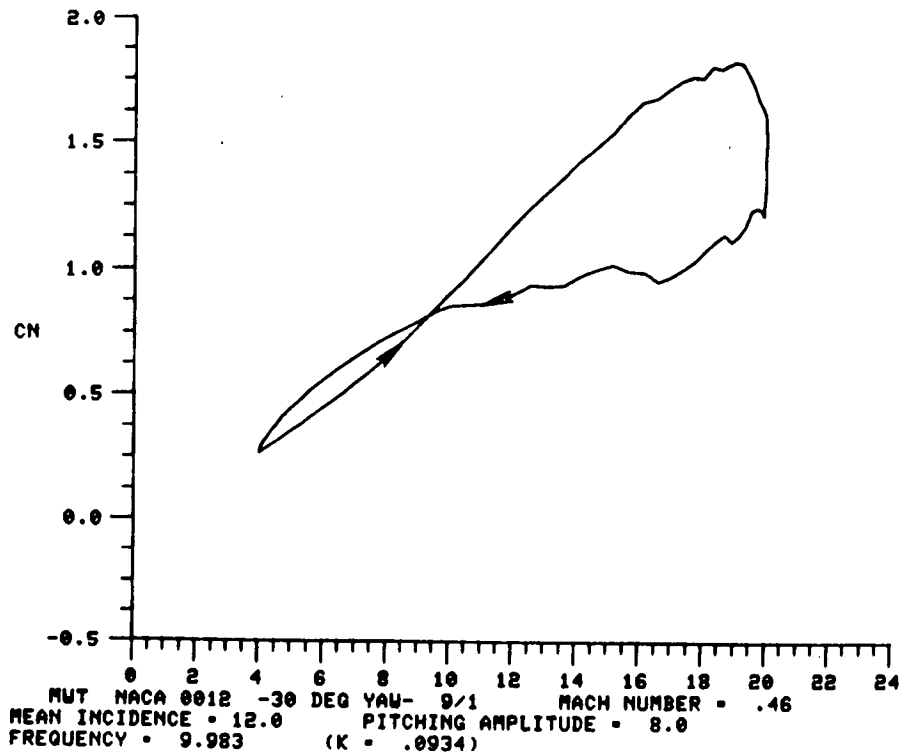
FILE 45. RUN1034.005



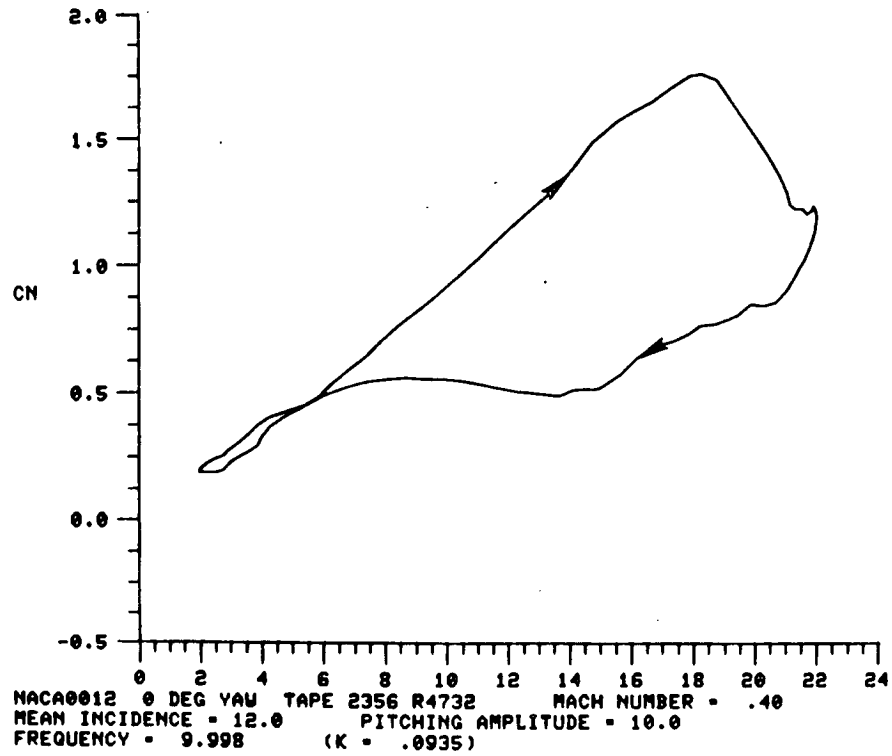
FILE 20. RUN 52.005



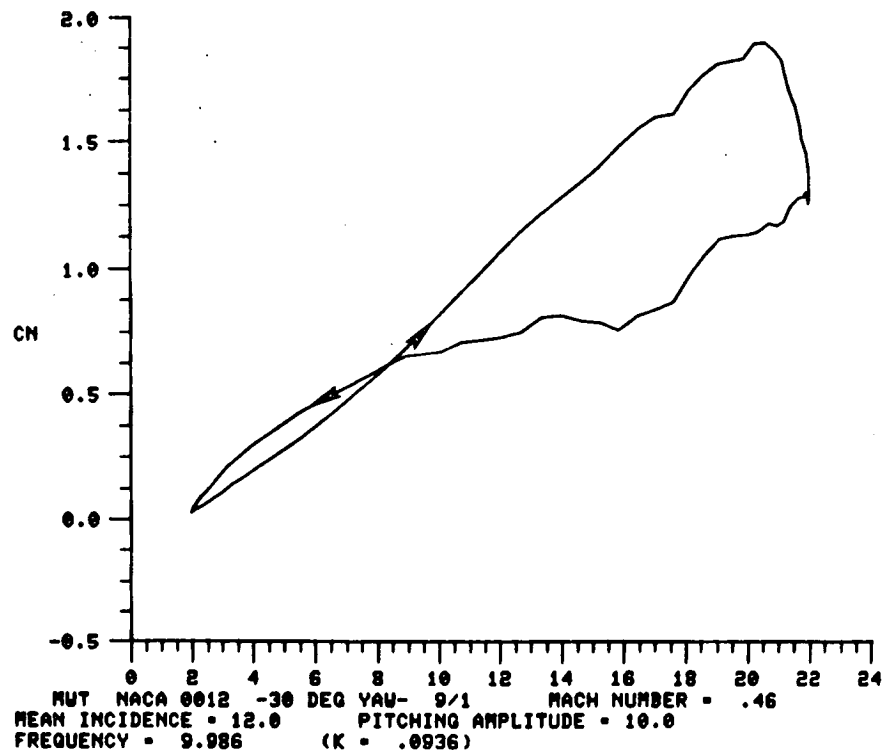
FILE 21. RUN3017.007



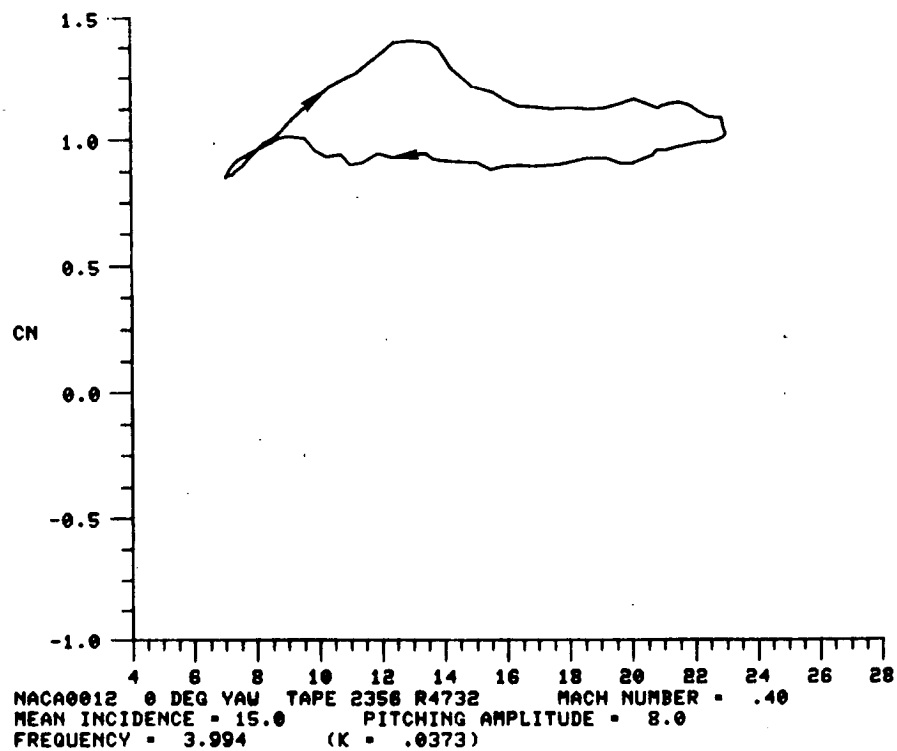
FILE 38. RUN 60.005



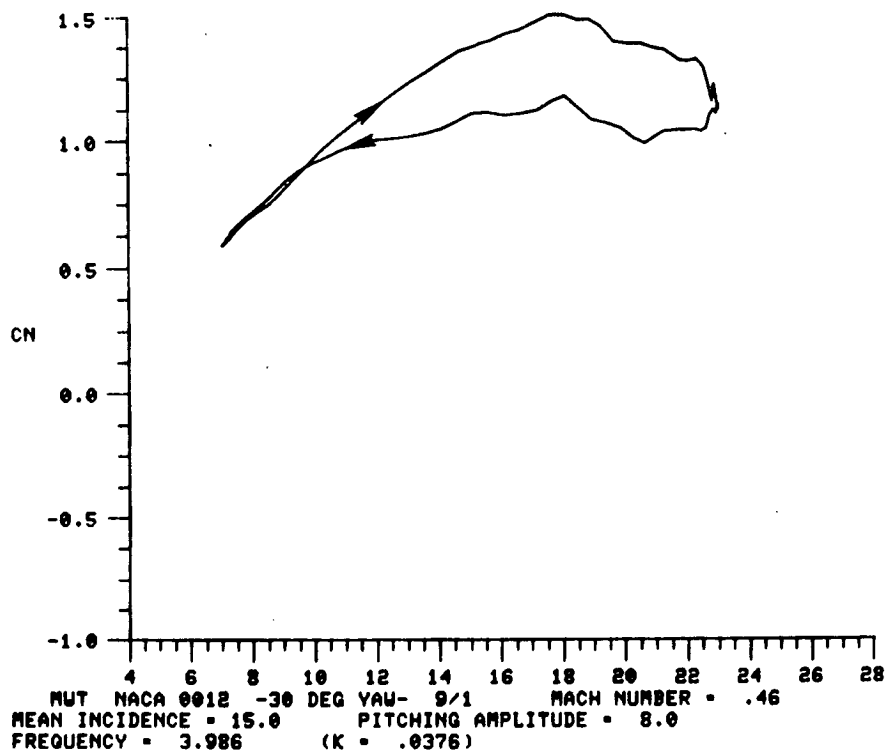
FILE 46. RUN1034.007



FILE 12. RUN 50.001

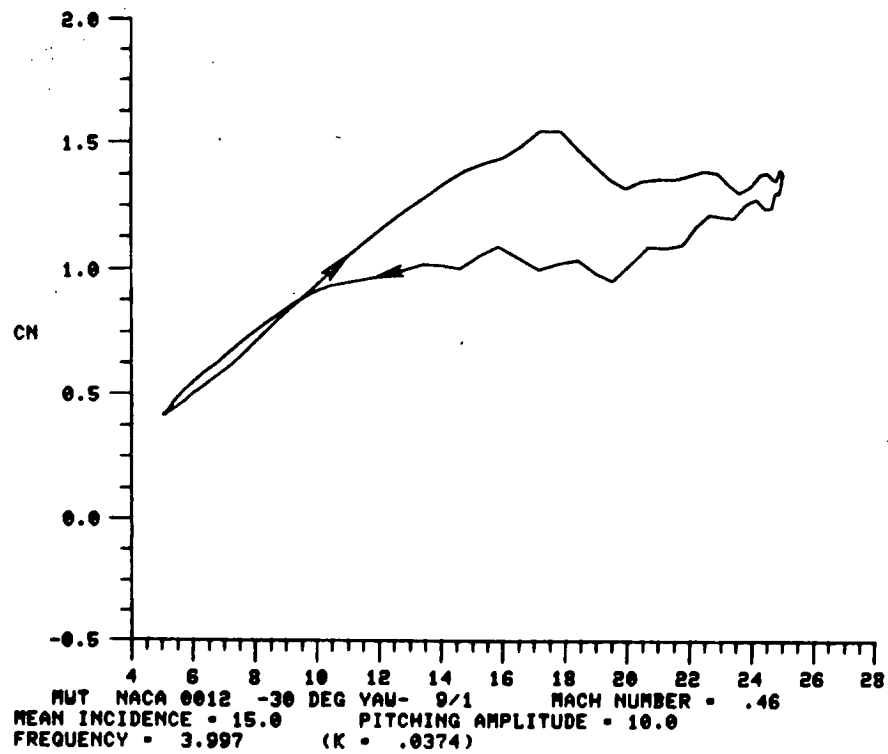


FILE 39. RUN3021.001

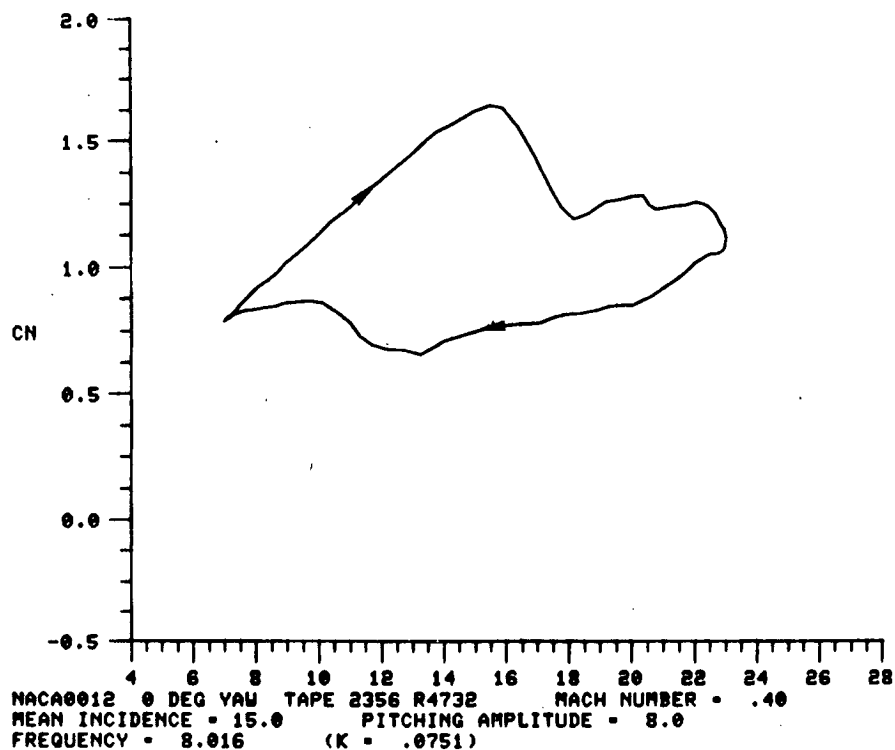


DATA WERE NOT OBTAINED

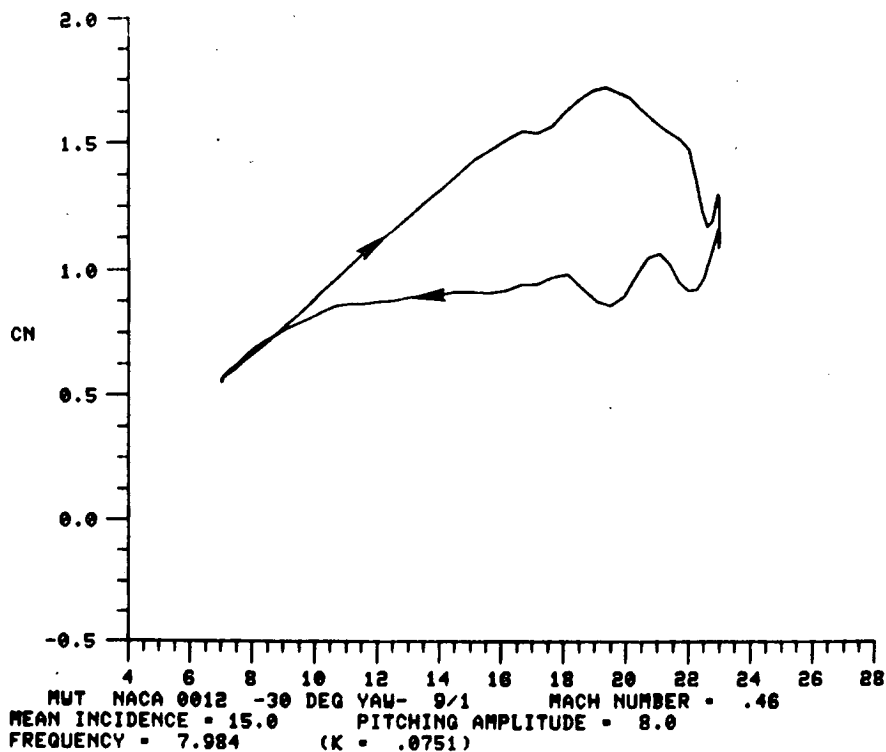
FILE 57. RUN1037.001



FILE 13. RUN 50.004

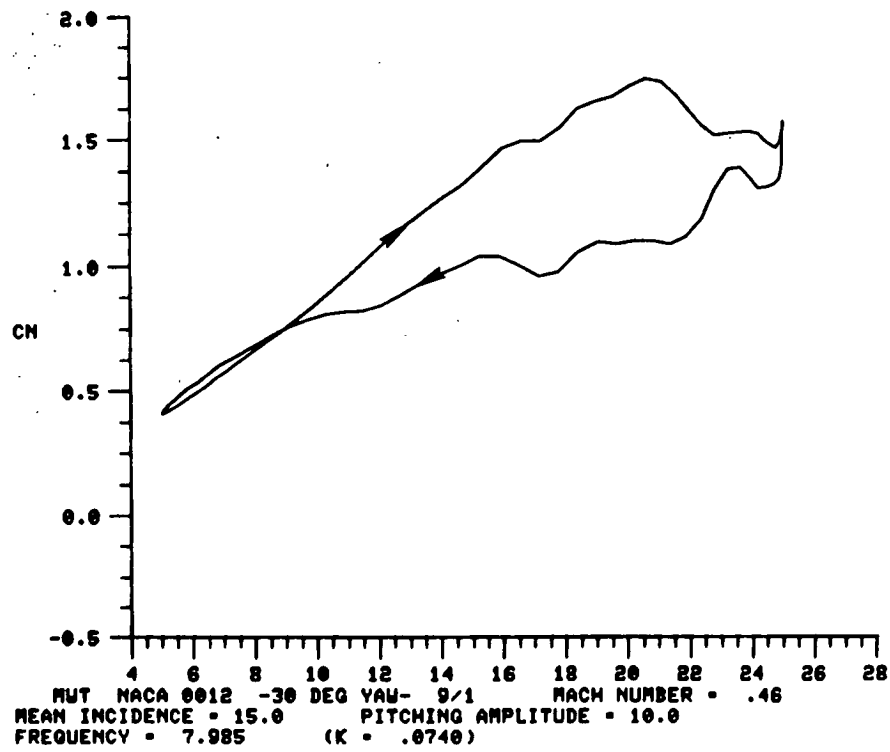


FILE 63. RUN1021.005

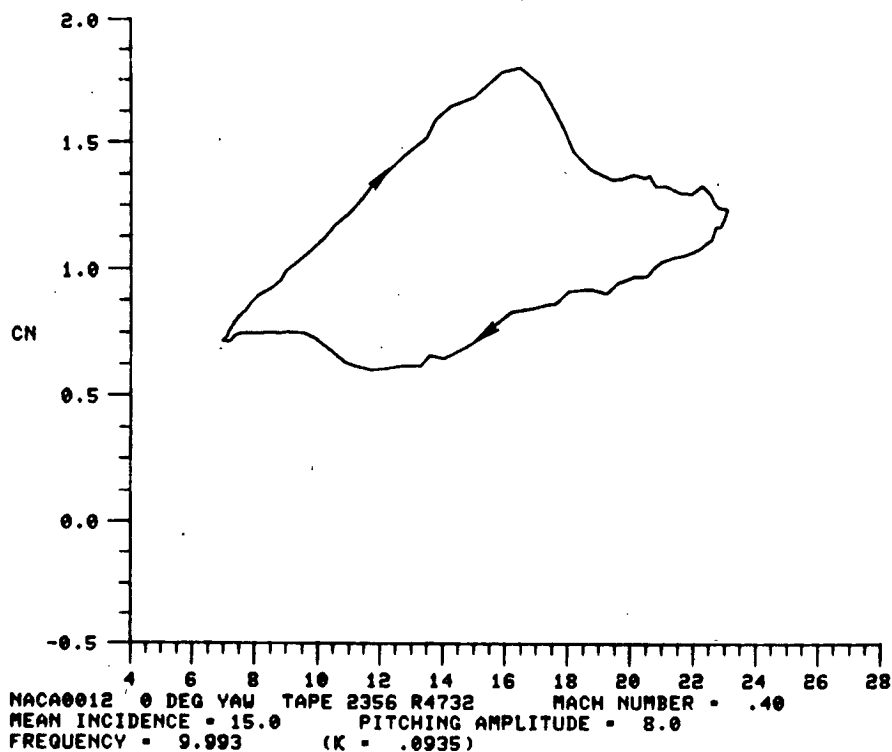


DATA WERE NOT OBTAINED

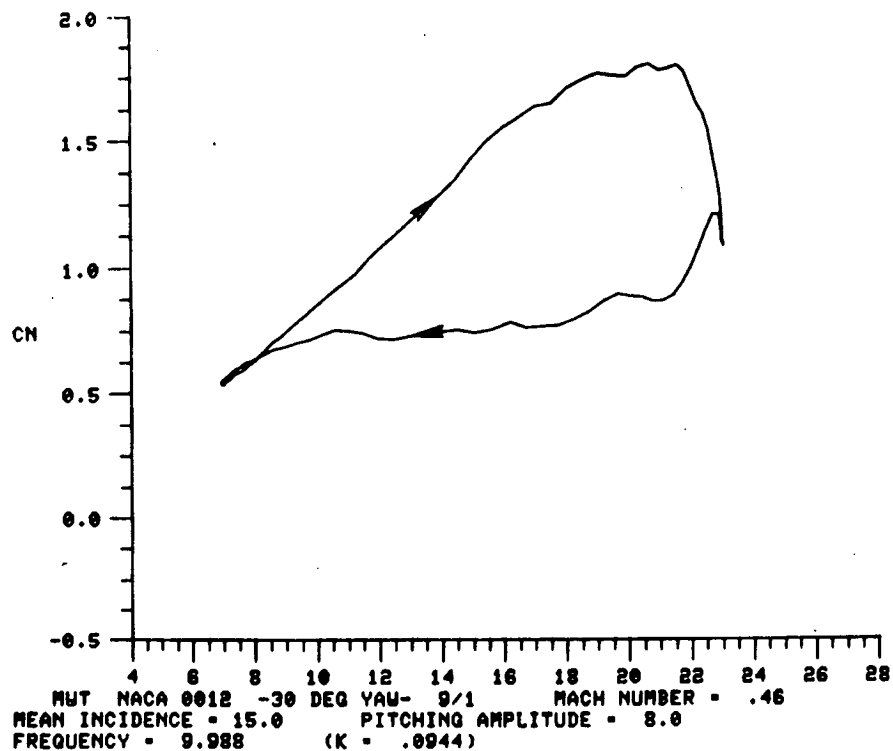
FILE 76. RUN1048.003



FILE 14. RUN 50.006

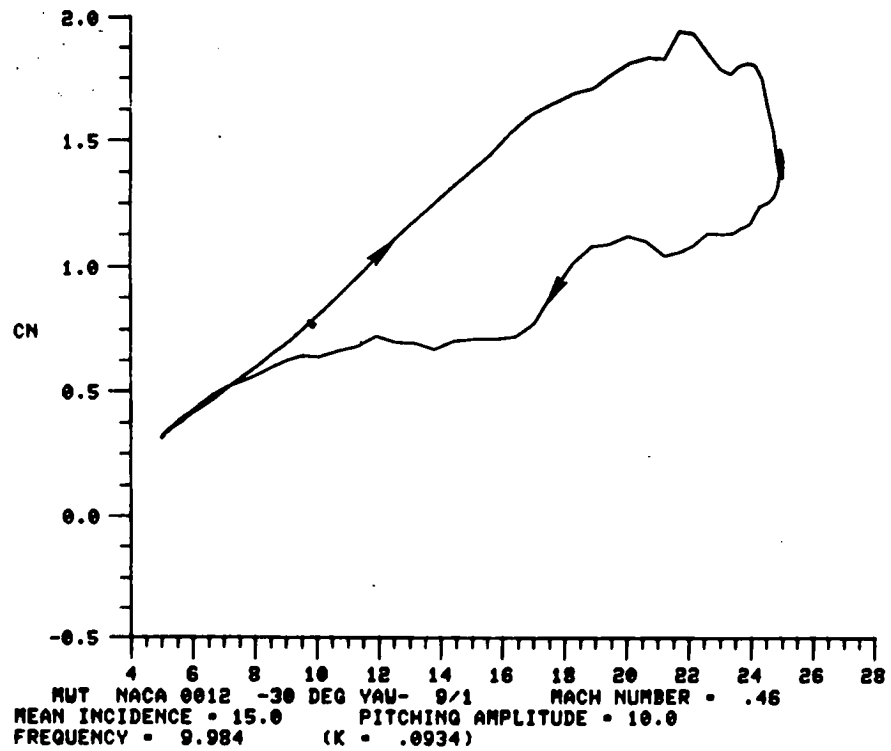


FILE 64. RUN1021.008



DATA WERE NOT OBTAINED

FILE 60. RUN1037.007

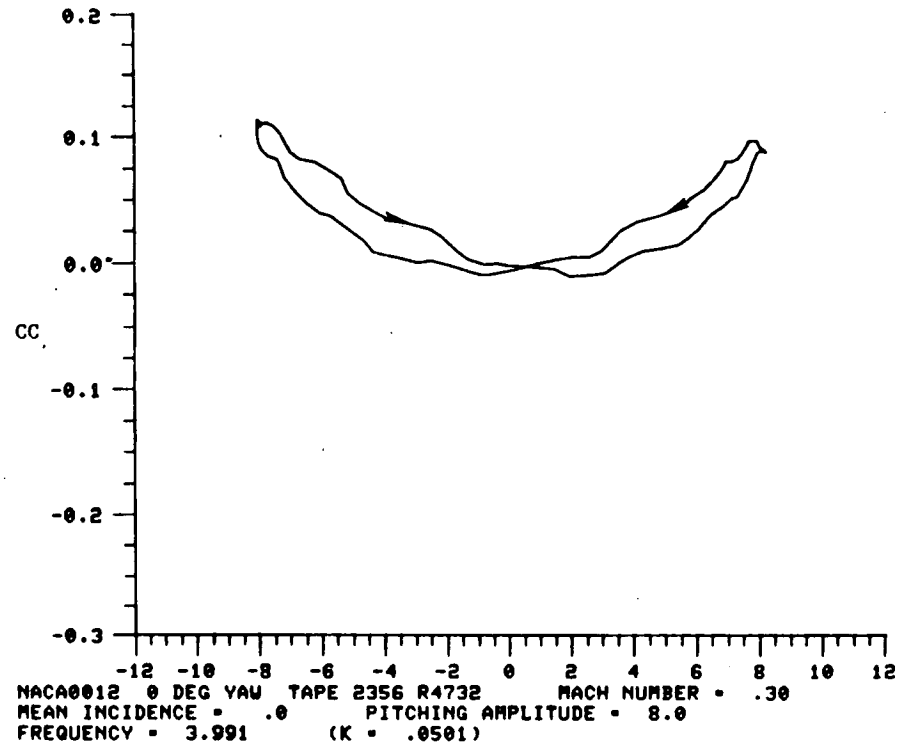


* EFFECT OF SWEEP ON THE CHORD FORCE RESPONSE *

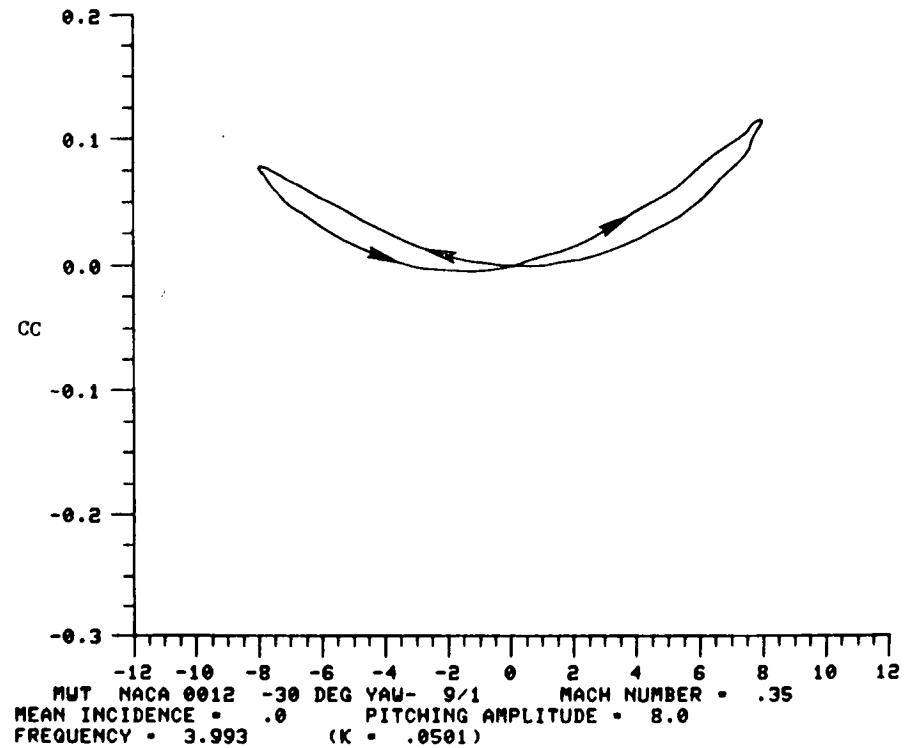
Chordwise Mach Number	Mean Incidence Angle	Frequency	Reduced Frequency	Page *
0.30 ↓	0	4.0	.050	58,59
	↓	8.0	.100	60,61
	↓	10.0	.124	62,63
	9	4.0	.050	64,65
	↓	8.0	.100	66,67
	↓	10.0	.124	68,69
	12	4.0	.050	70,71
	↓	8.0	.100	72,73
	↓	10.0	.124	74,75
	15	4.0	.050	76,77
	↓	8.0	.100	78,79
	↓	10.0	.124	80,81
0.40 ↓	0	4.0	.037	82,83
	↓	8.0	.075	84,85
	↓	10.0	.093	86,87
	9	4.0	.037	88,89
	↓	8.0	.075	90,91
	↓	10.0	.093	92,93
	12	4.0	.037	94,95
	↓	8.0	.075	96,97
	↓	10.0	.093	98,99
	15	4.0	.037	100,101
	↓	8.0	.075	102,103
	↓	10.0	.093	104,105

* The effect of sweep is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

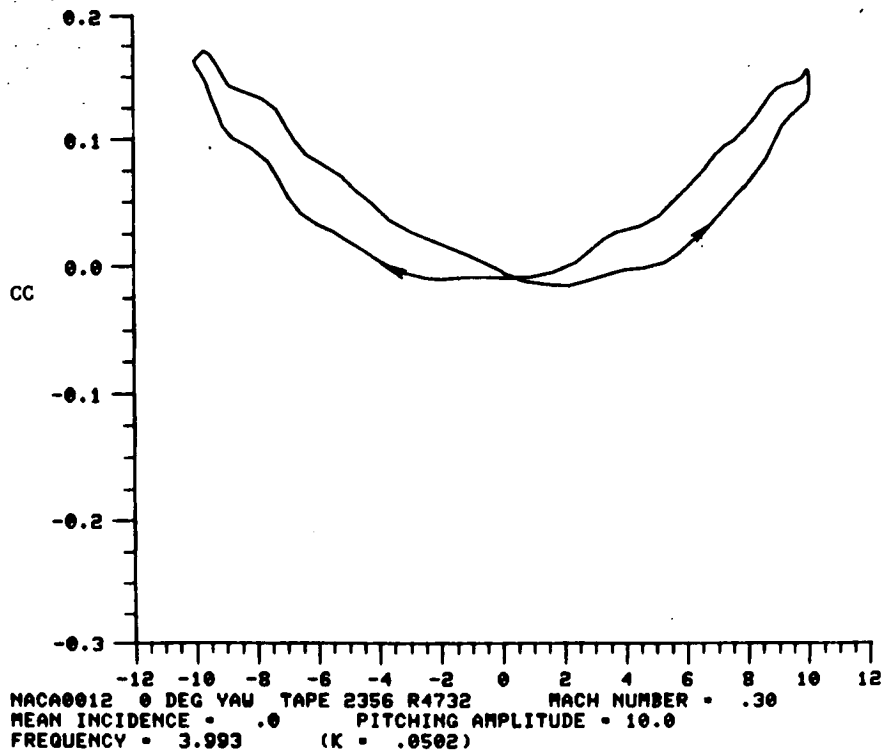
FILE 21. RUN 53.001



FILE 8. RUN1007.005

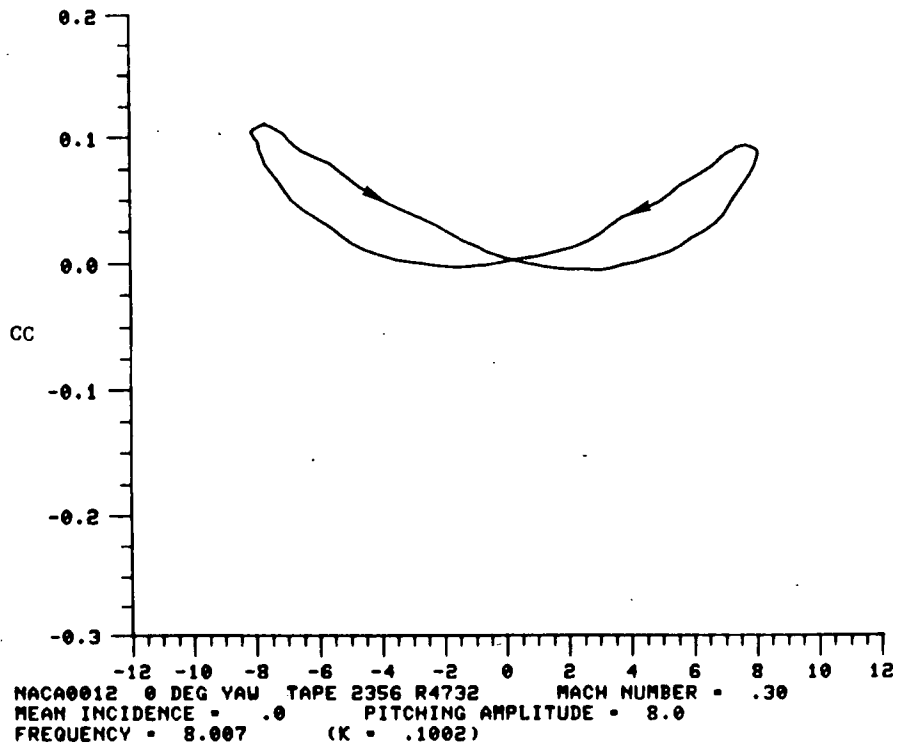


FILE 87. RUN 57.001

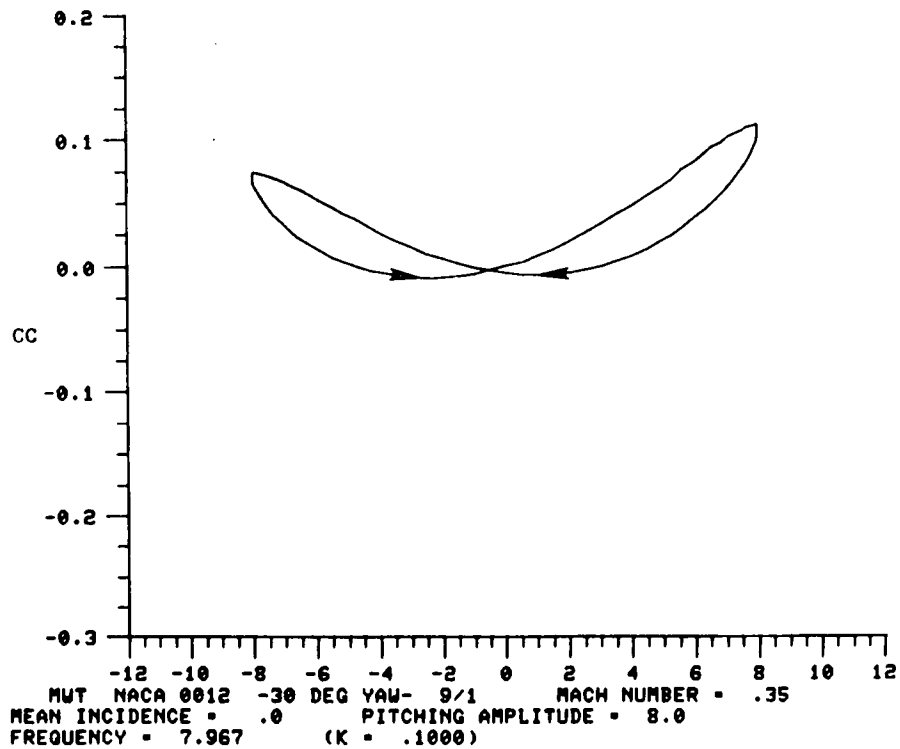


DATA WERE NOT OBTAINED

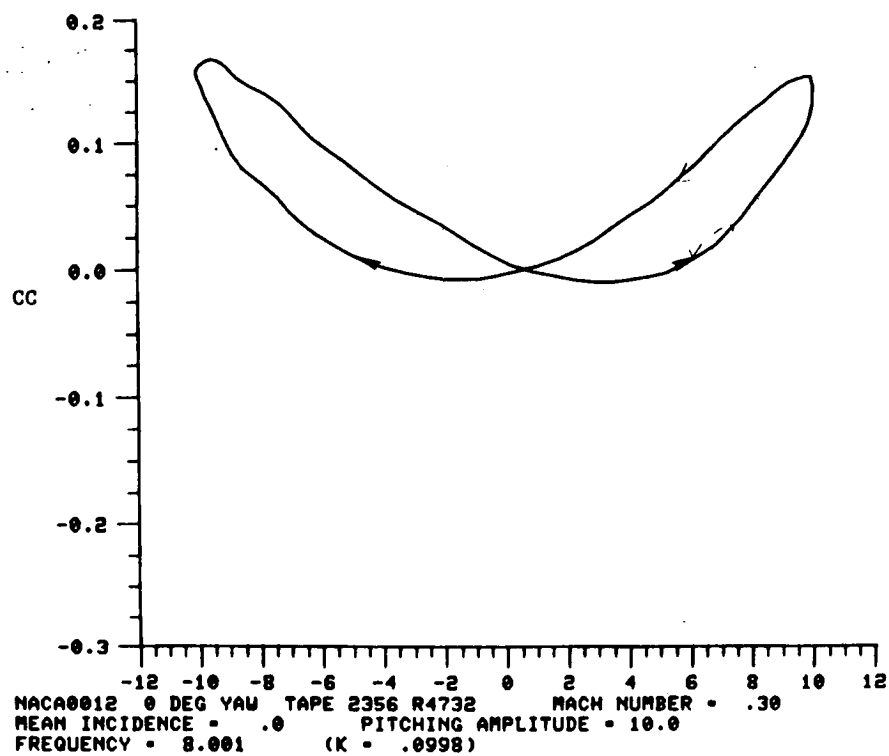
FILE 22. RUN 53.003



FILE 10. RUN1007.009

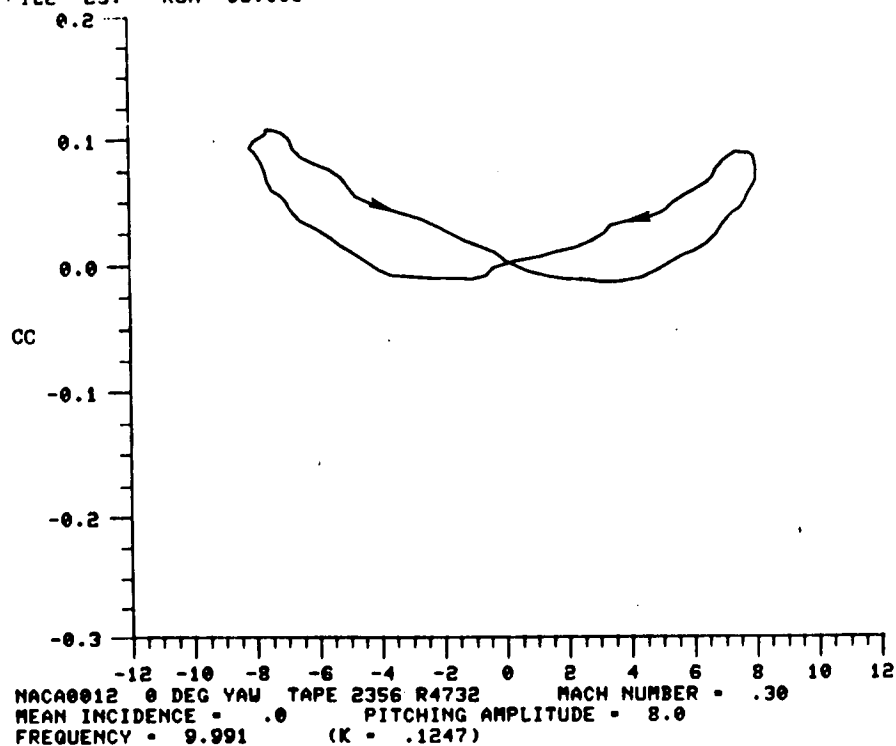


FILE 28. RUN 57.003

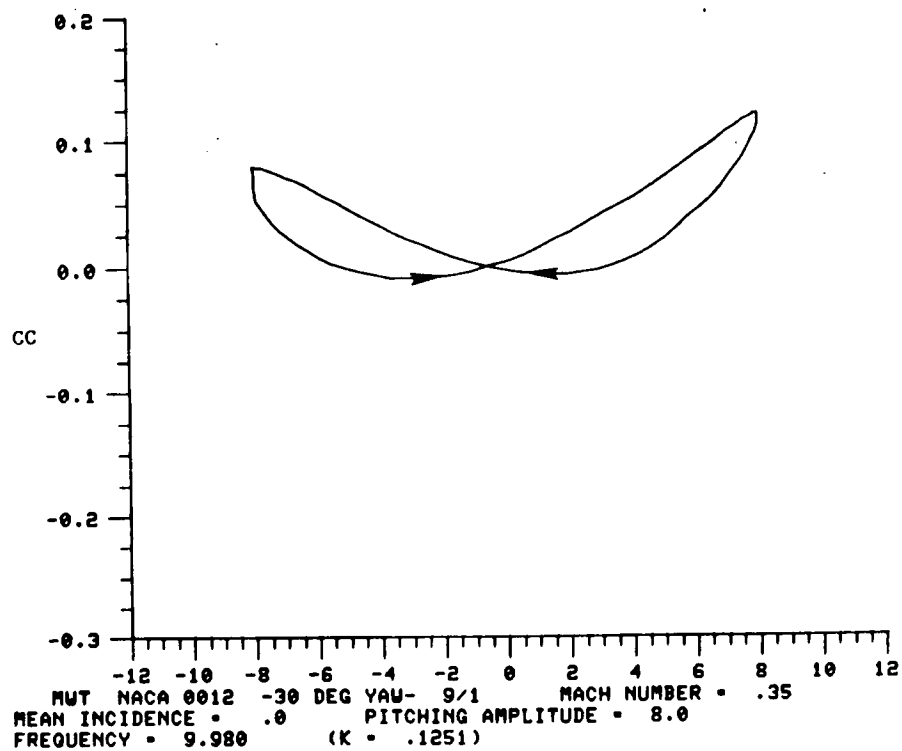


DATA WERE NOT OBTAINED

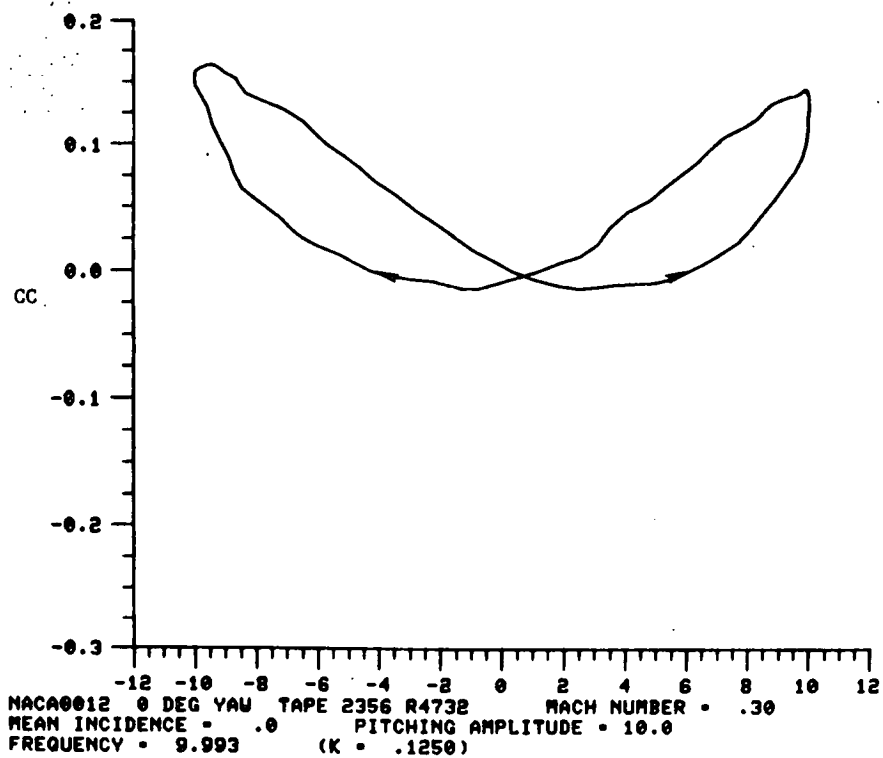
FILE 23. RUN 53.005



FILE 11. RUN1007.011

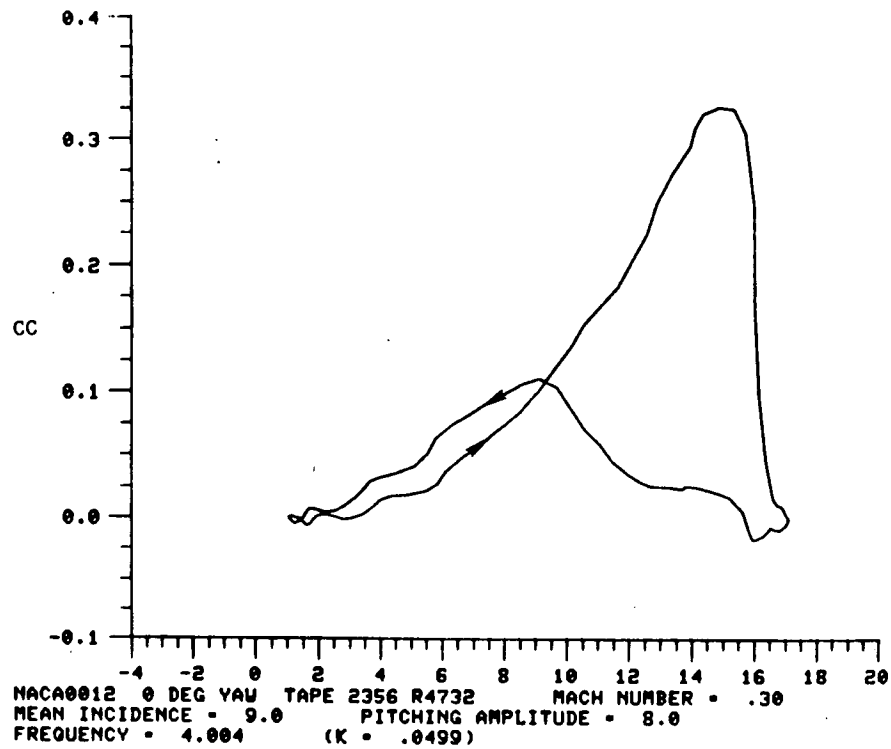


FILE 29. RUN 57.005

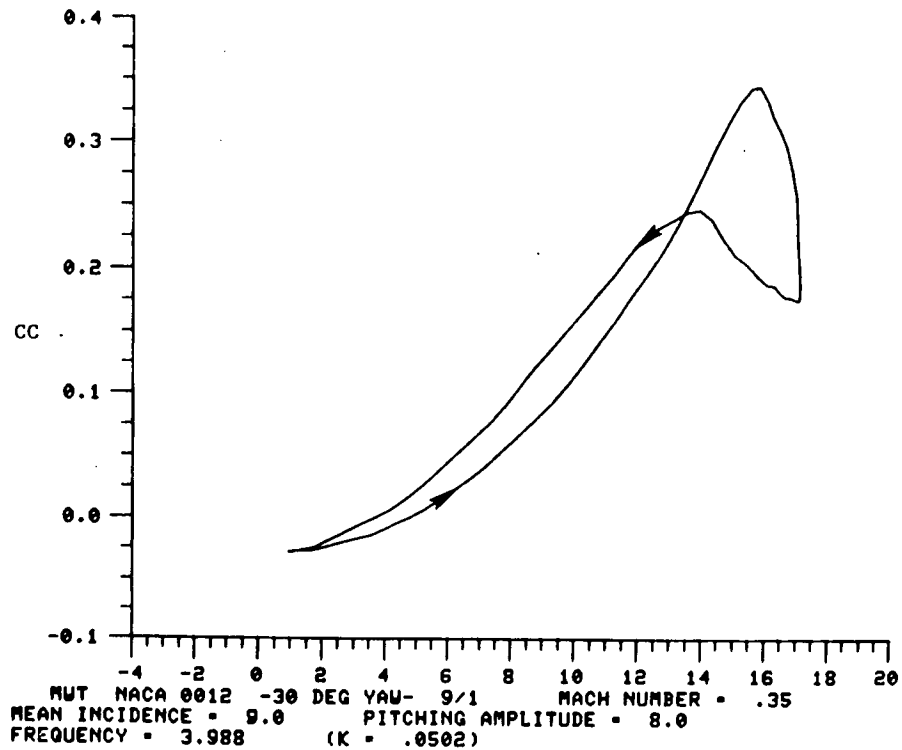


DATA WERE NOT OBTAINED

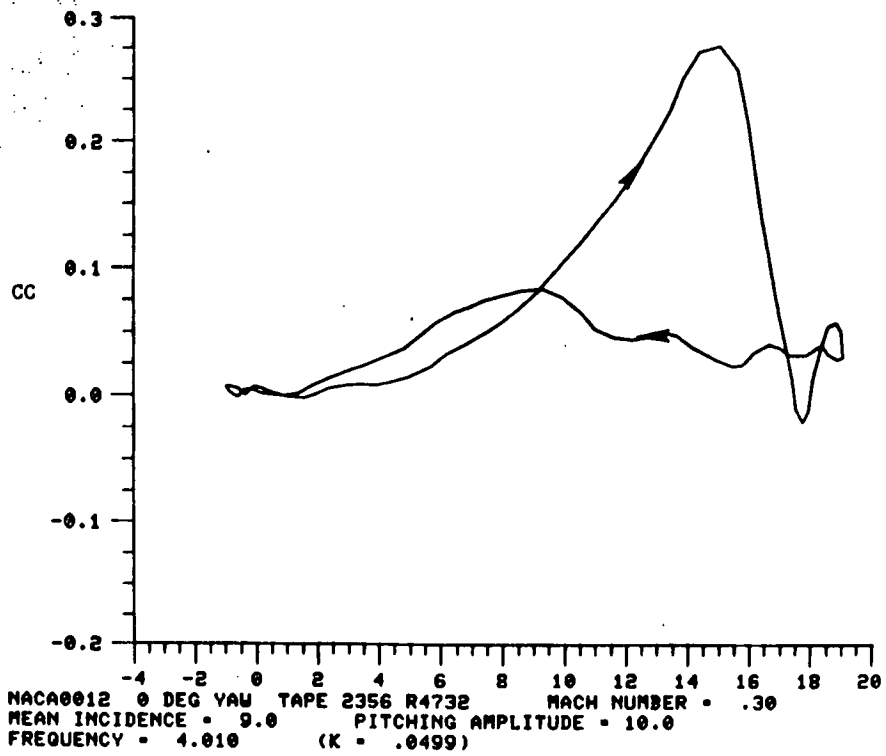
FILE 3. RUN 47.001



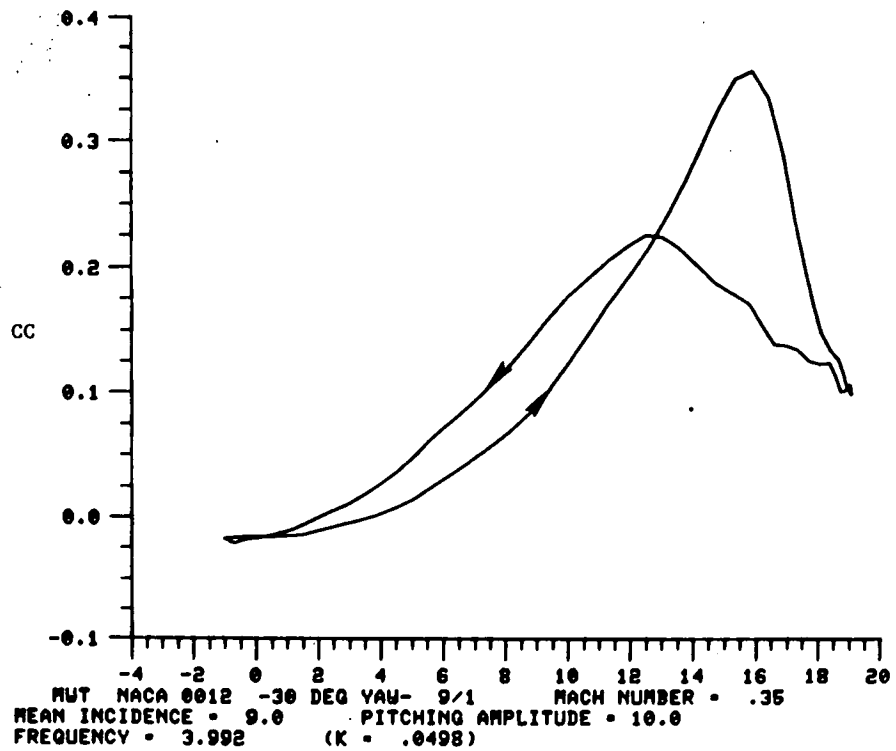
FILE 26. RUN1018.013



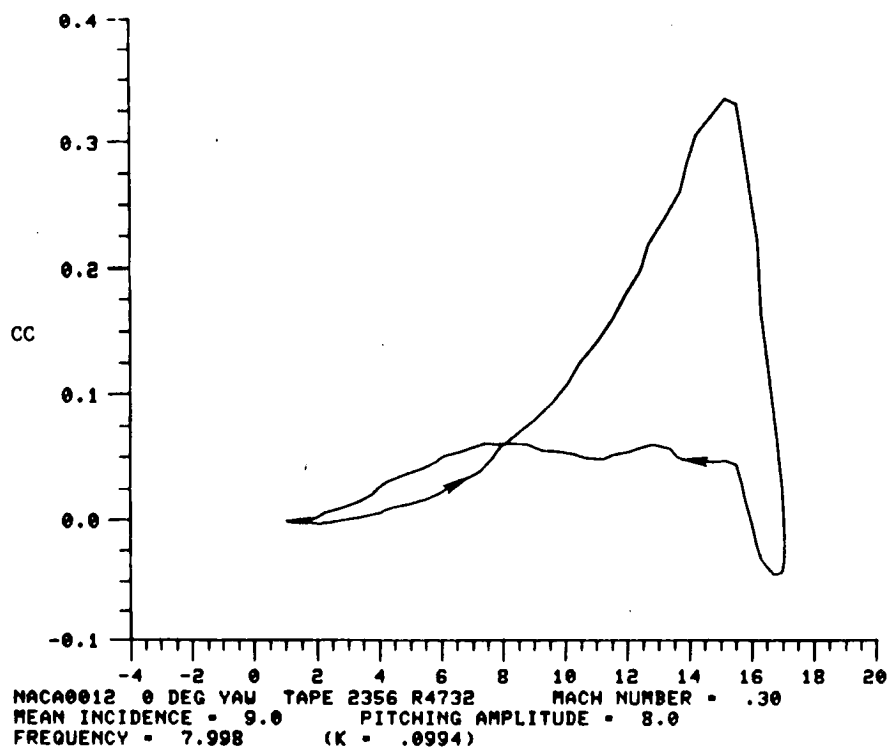
FILE 39. RUN 61.001



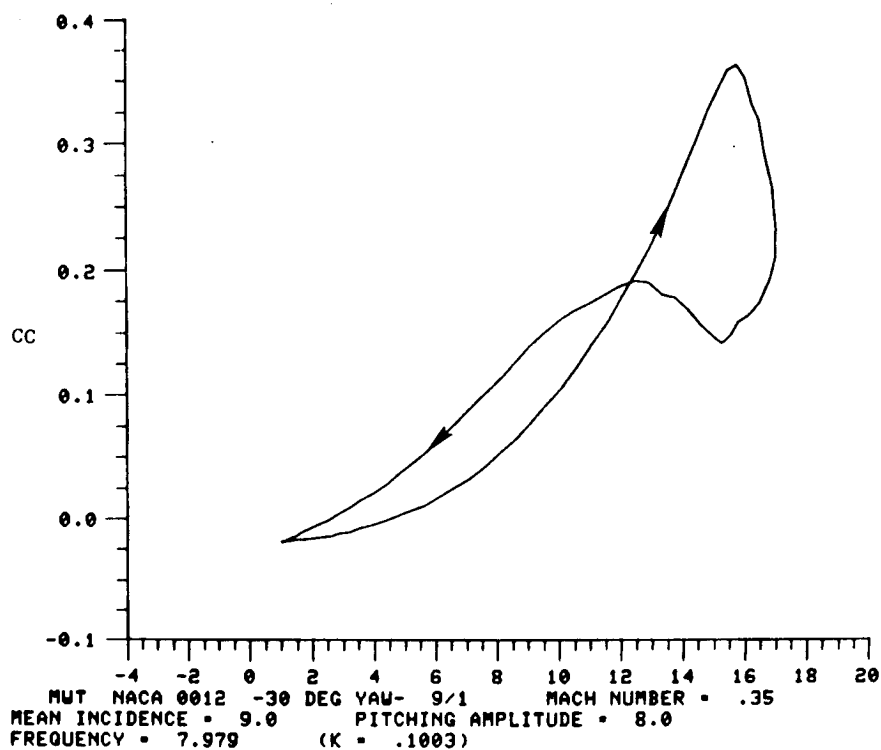
FILE 6. RUN1029.008



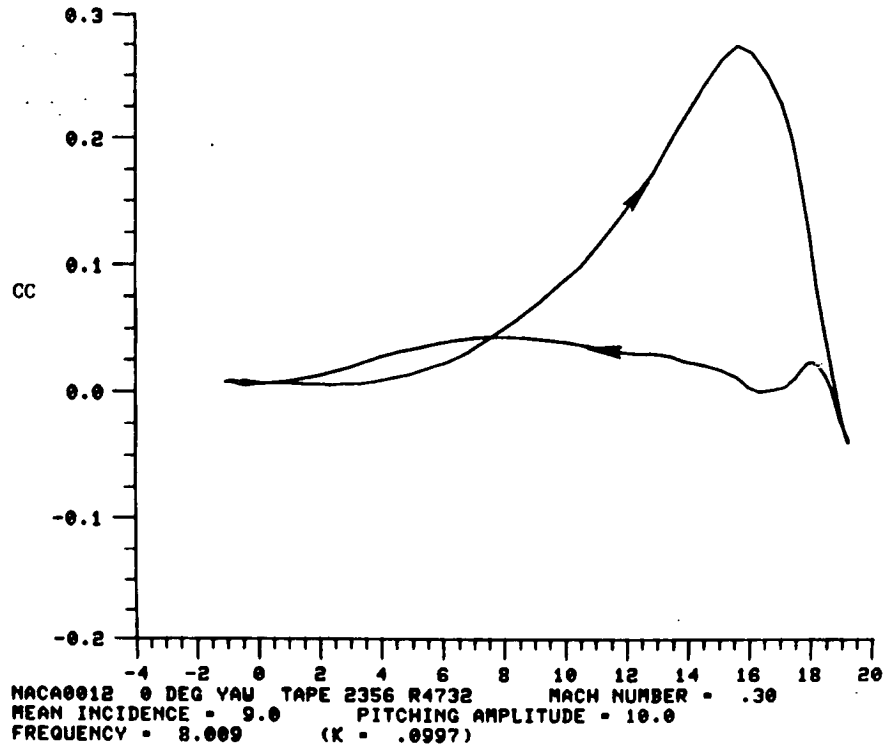
FILE 4. RUN 47.003



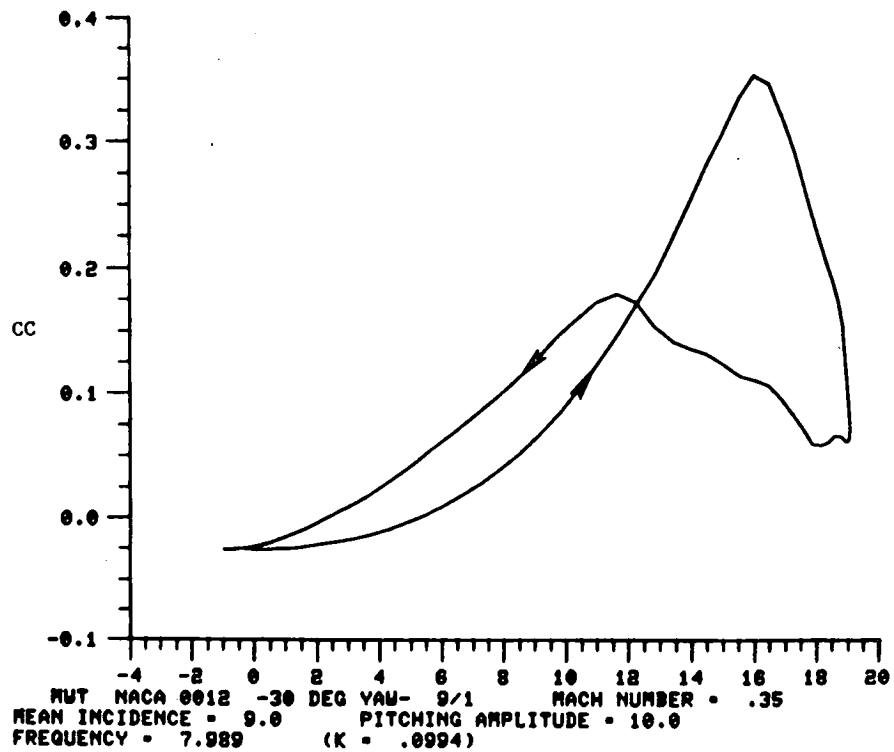
FILE 28. RUN1018.017



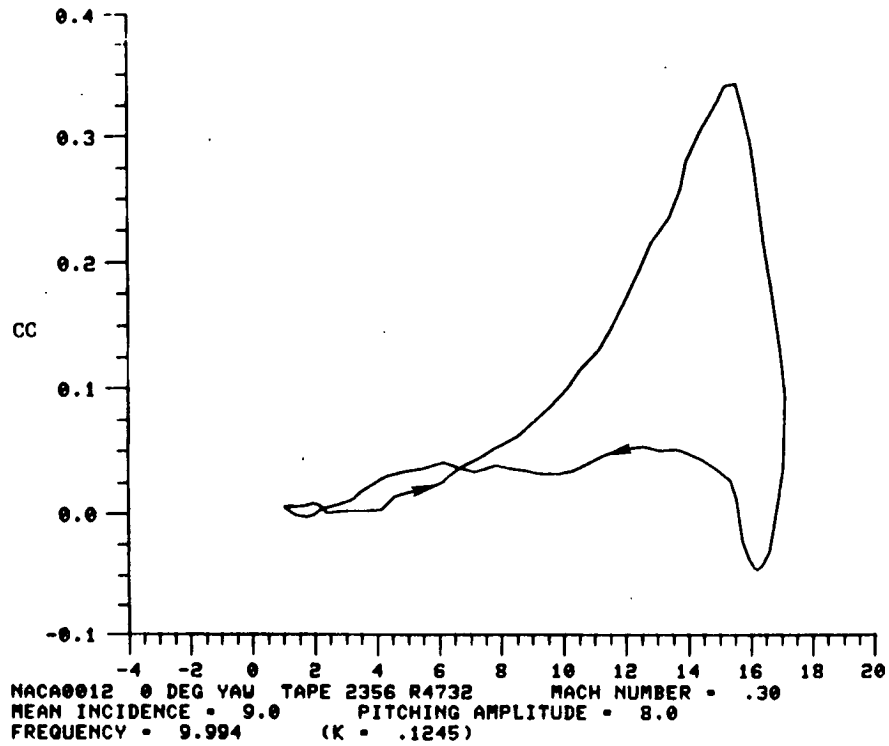
FILE 40. RUN 61.004



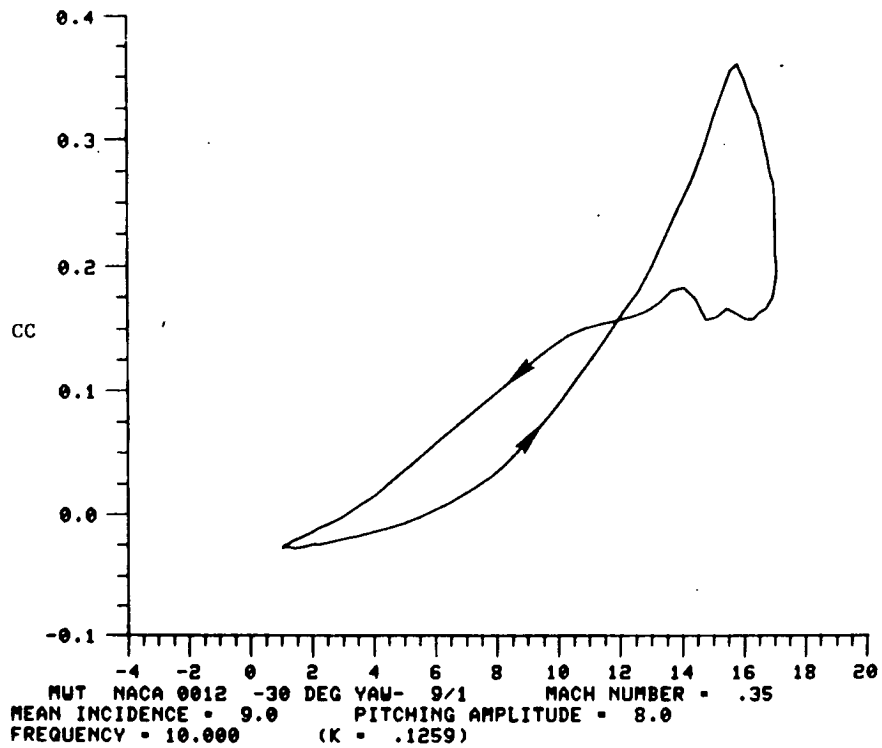
FILE 8. RUN1029.012



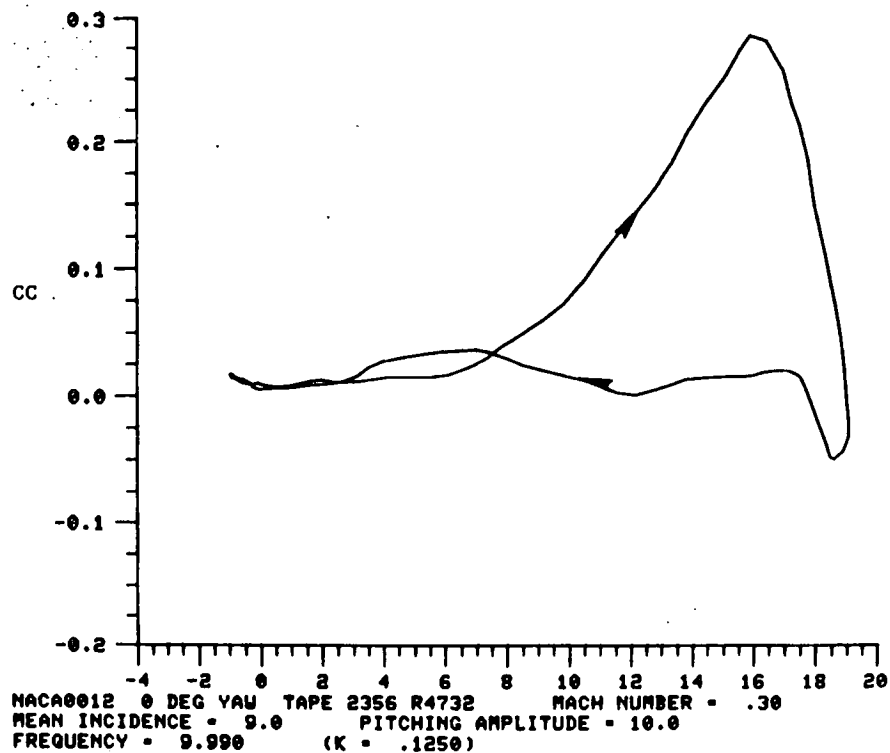
FILE 5. RUN 47.005



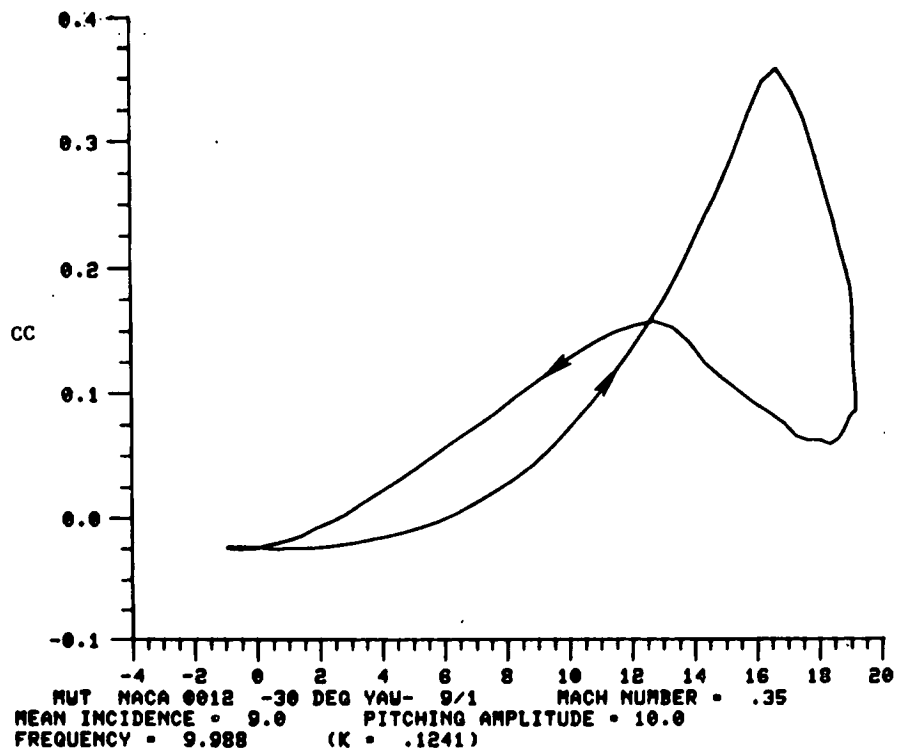
FILE 29. RUN1018.019



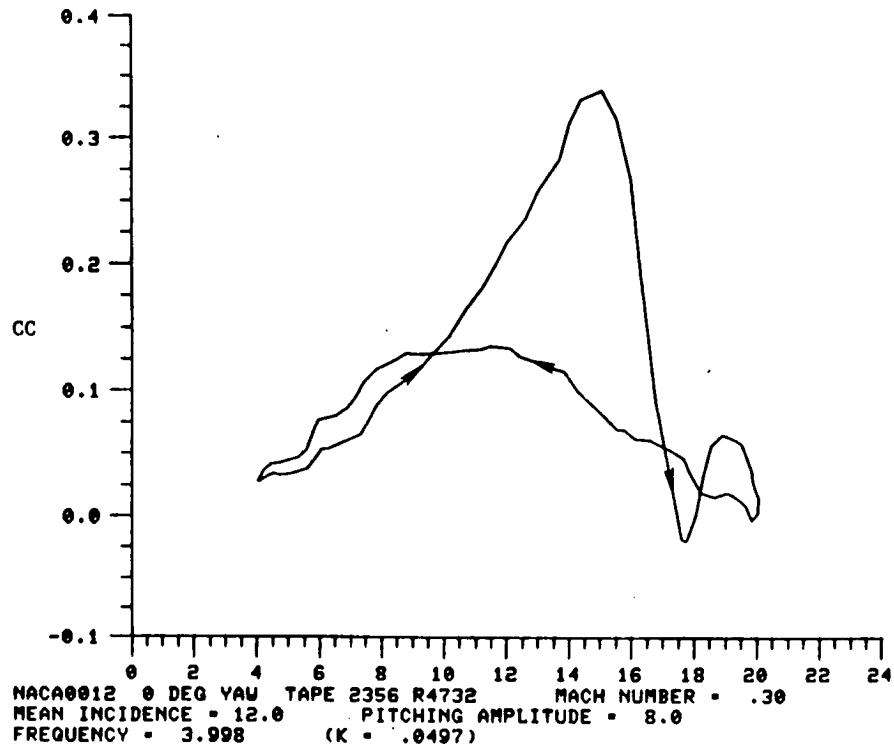
FILE 41. RUN 61.006



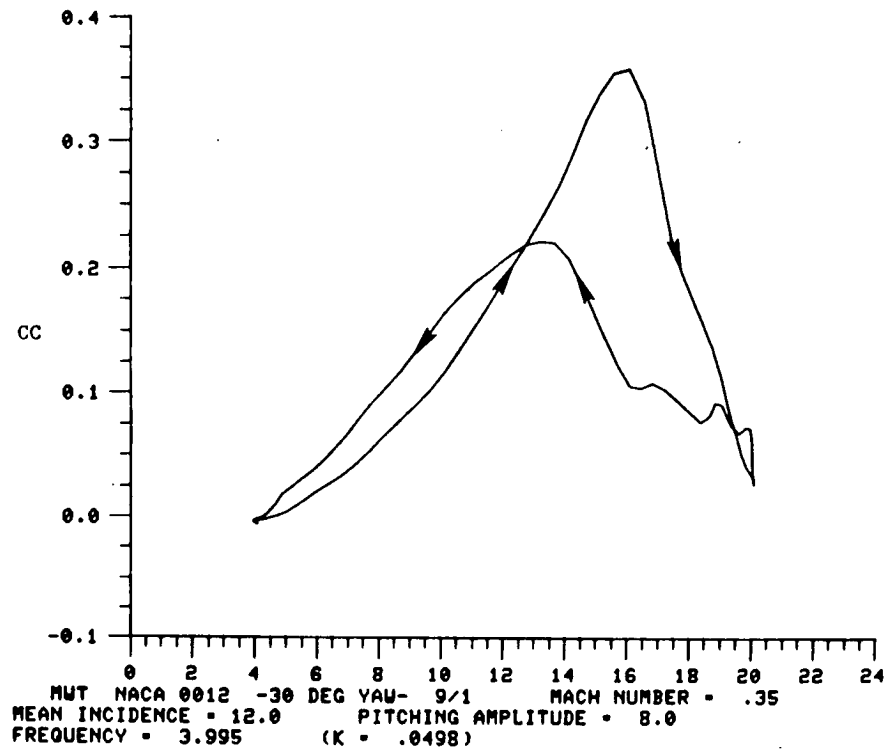
FILE 9. RUN1029.014



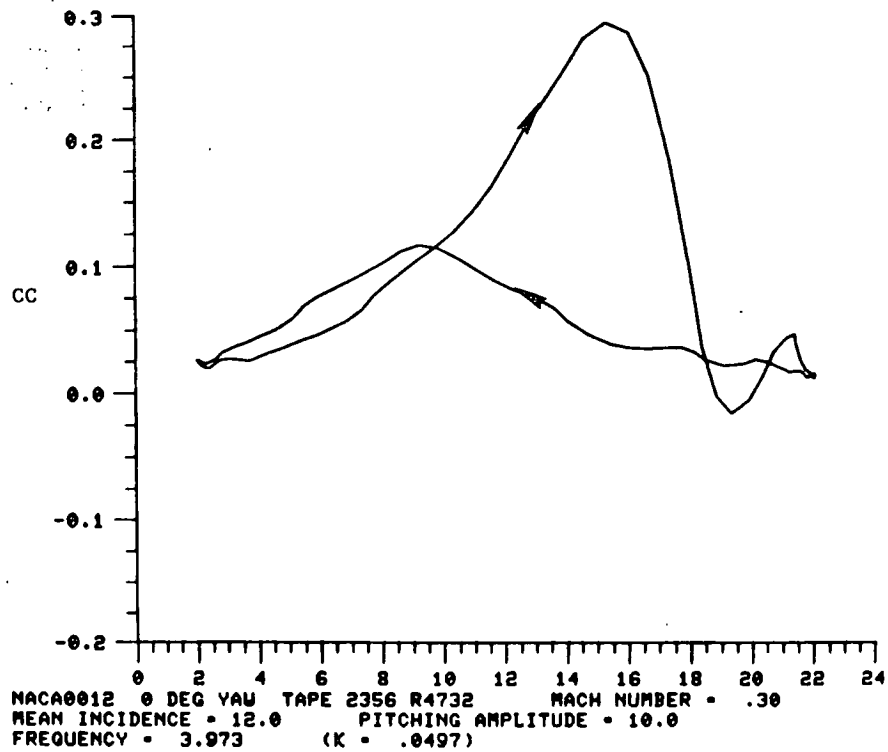
FILE 15. RUN 51.001



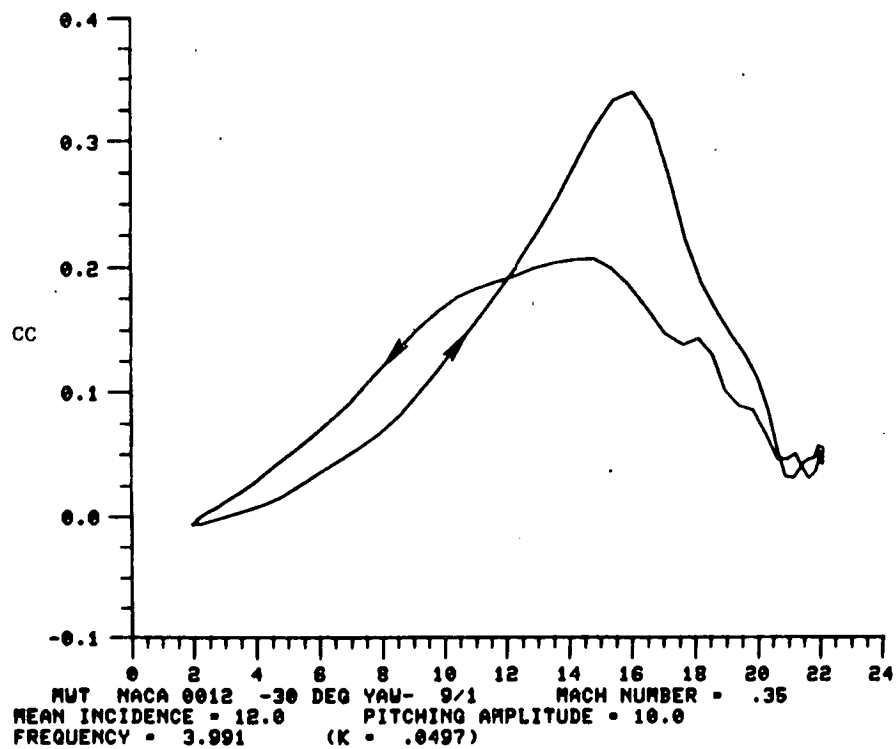
FILE 53. RUN1016.004



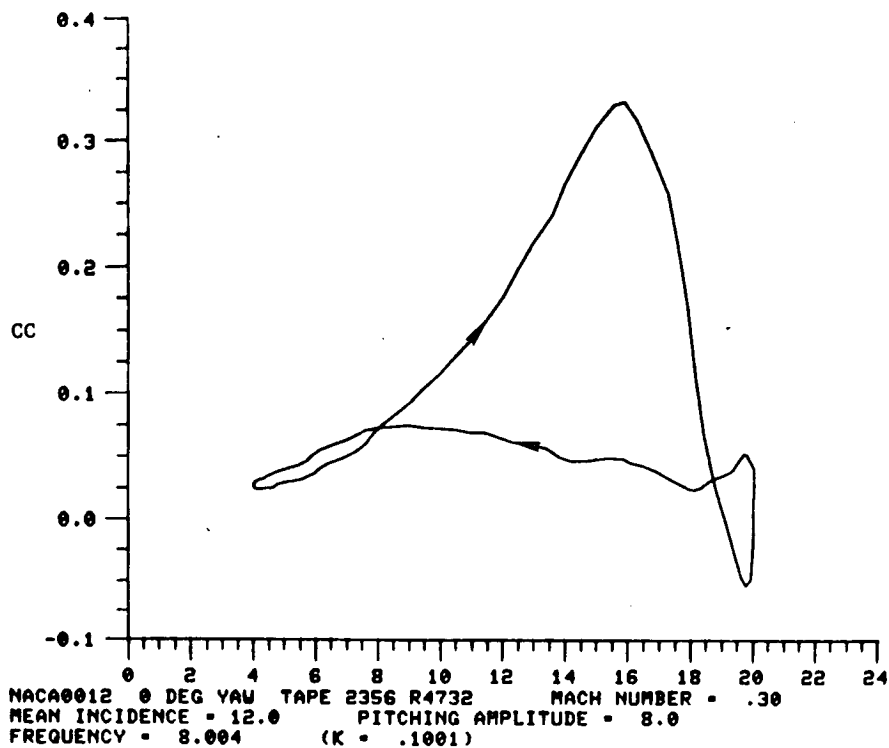
FILE 33. RUN 59.001



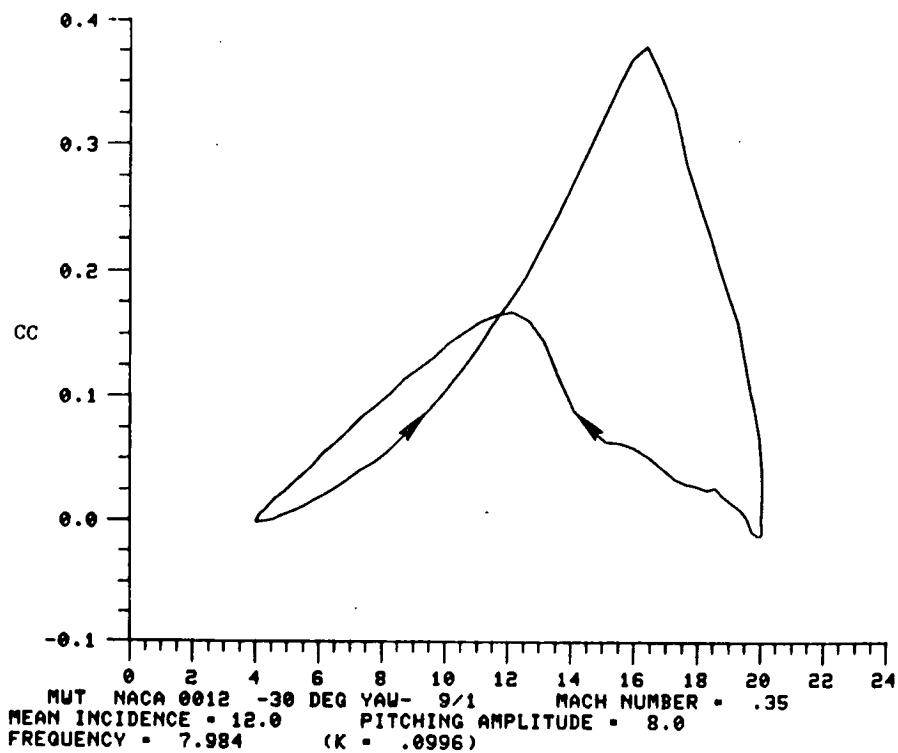
FILE 39. RUN1033.008



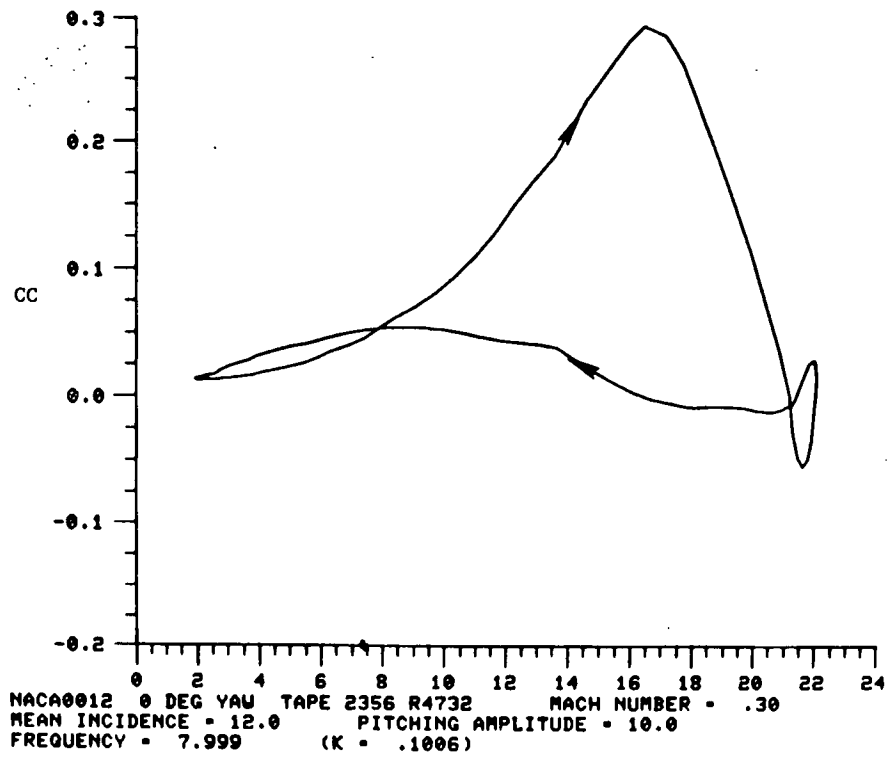
FILE 16. RUN 51.003



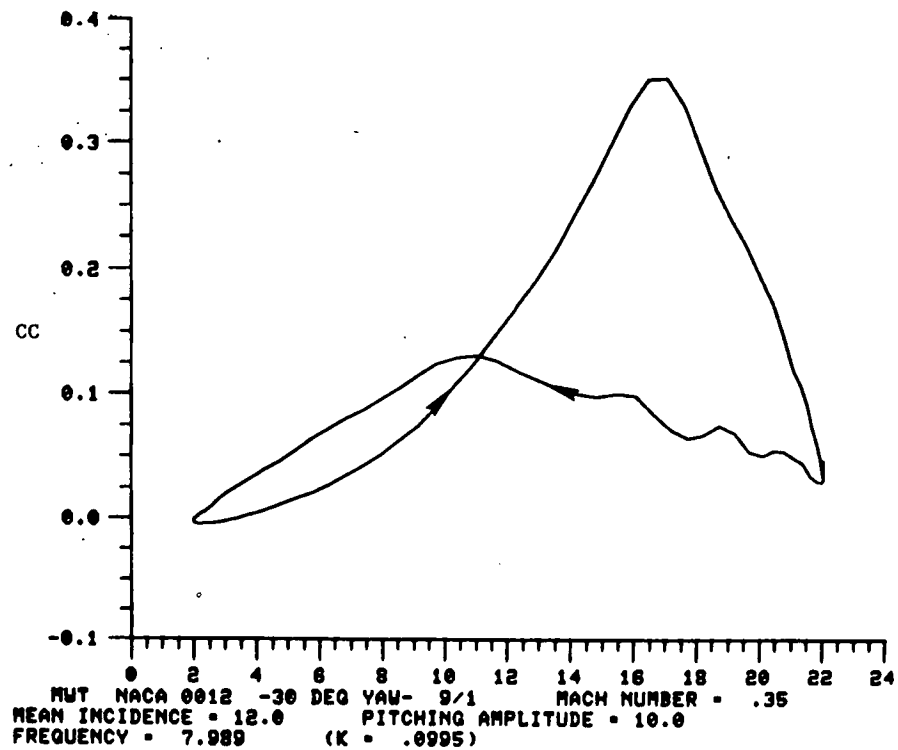
FILE 19. RUN1016.010



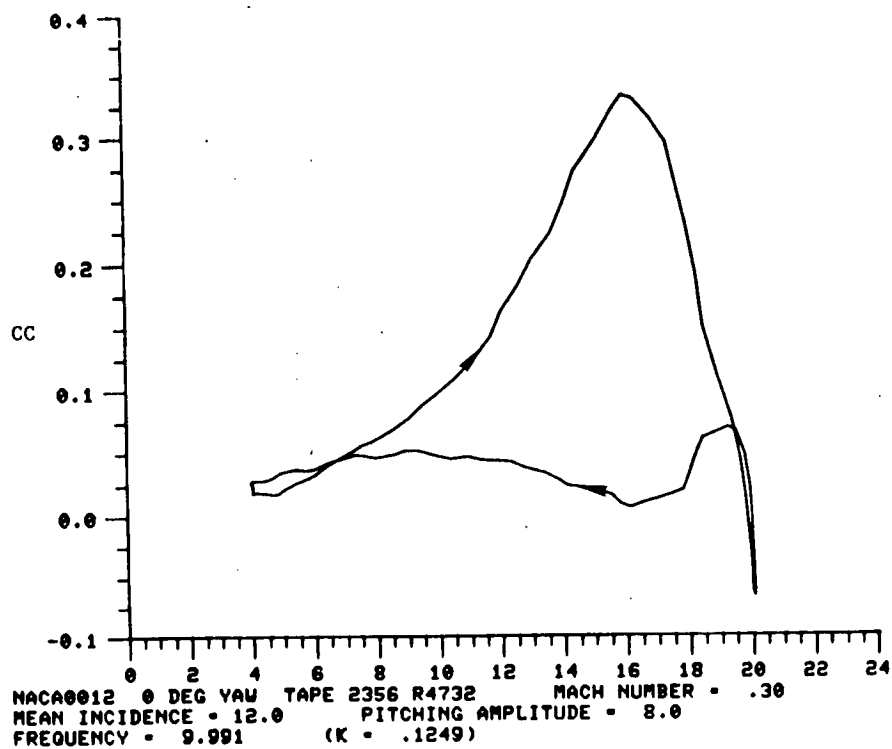
FILE 34. RUN 59.004



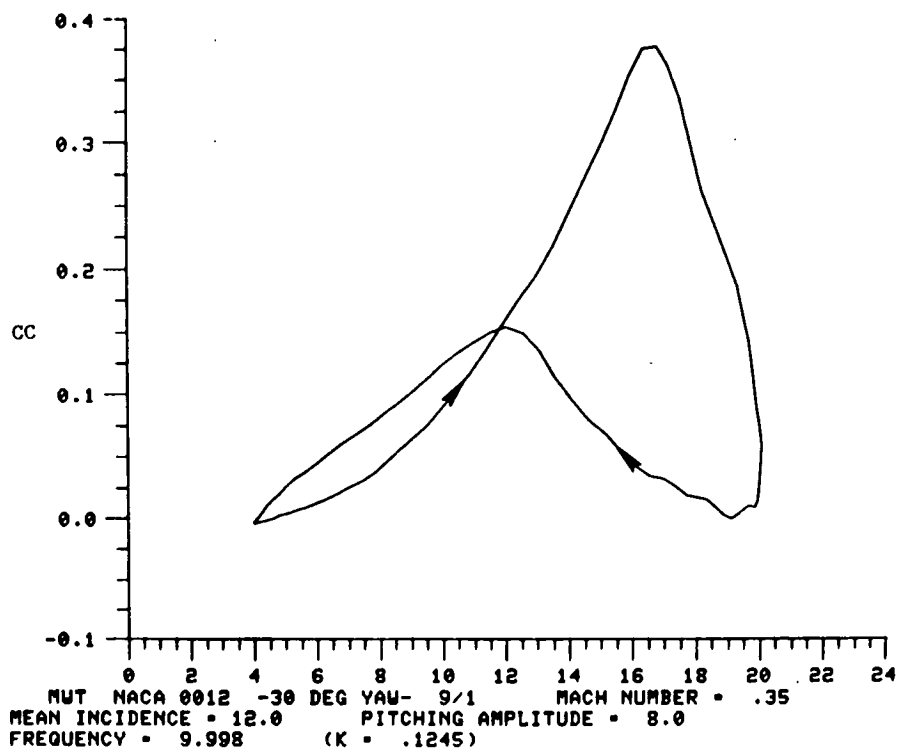
FILE 41. RUN1033.018



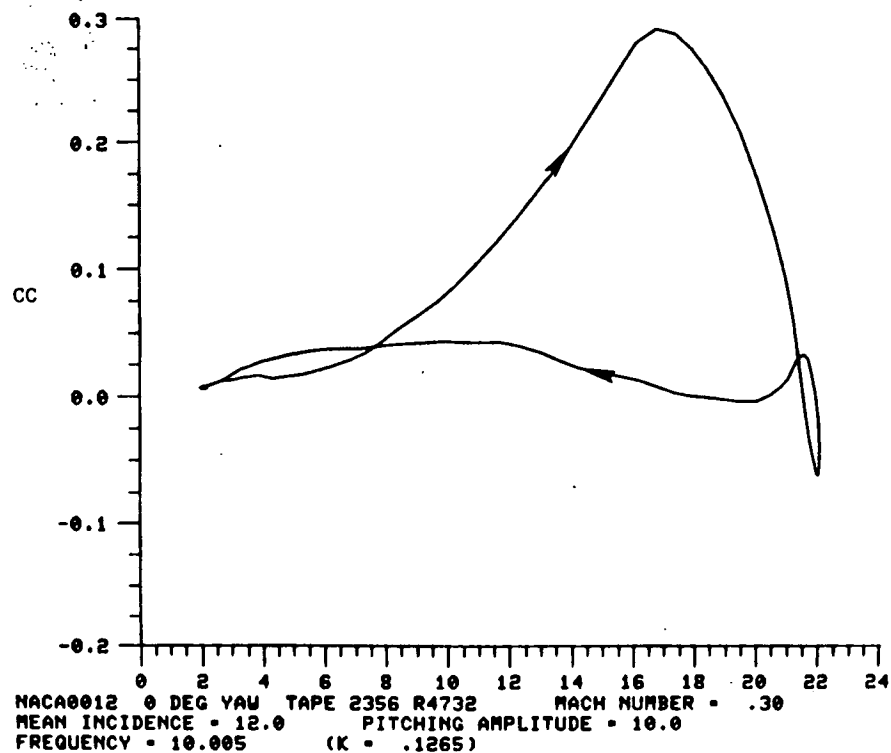
FILE 17. RUN 51.005



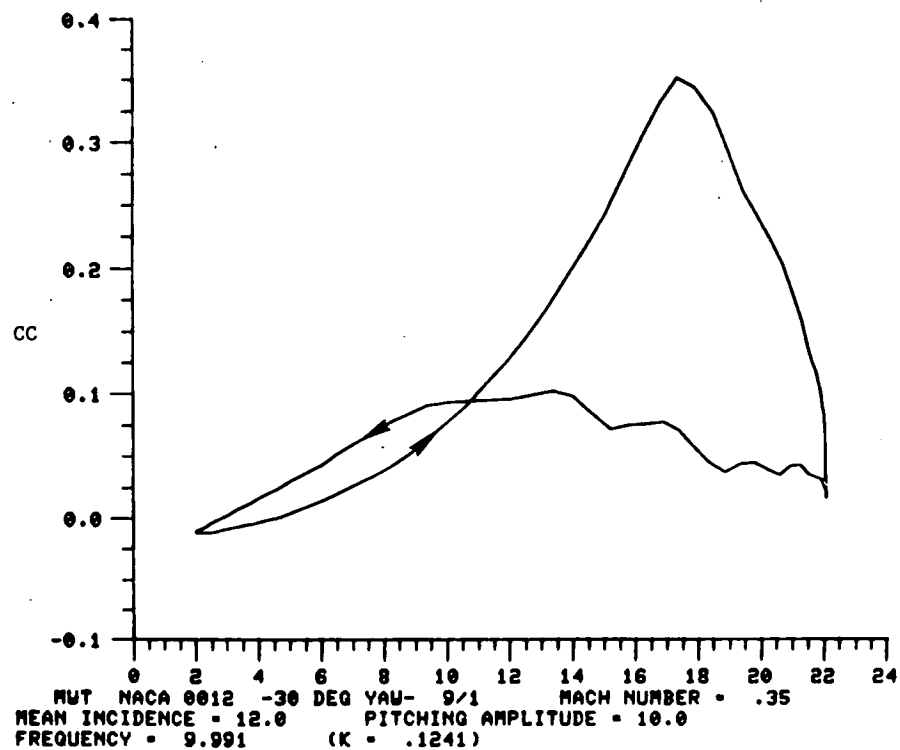
FILE 20. RUN3016.012



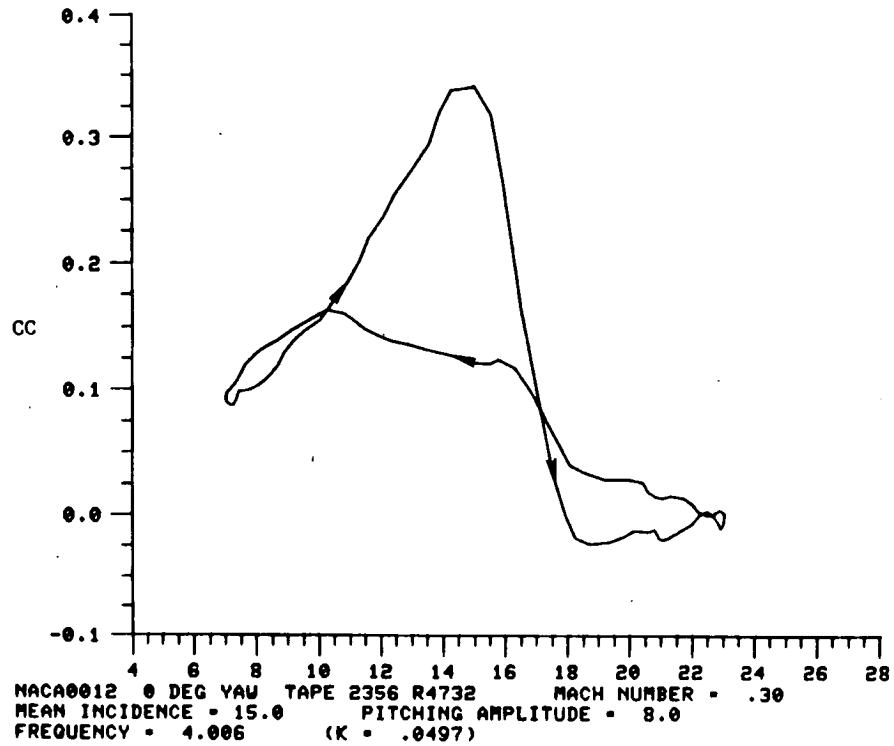
FILE 35. RUN 59.007



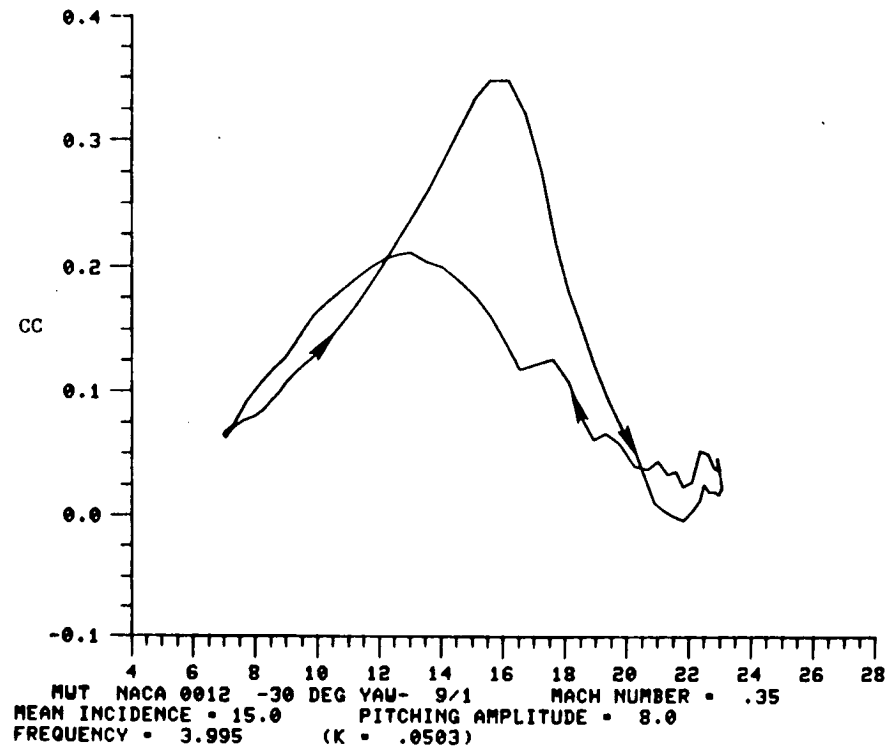
FILE 42. RUN1033.014



FILE 9. RUN 49.001

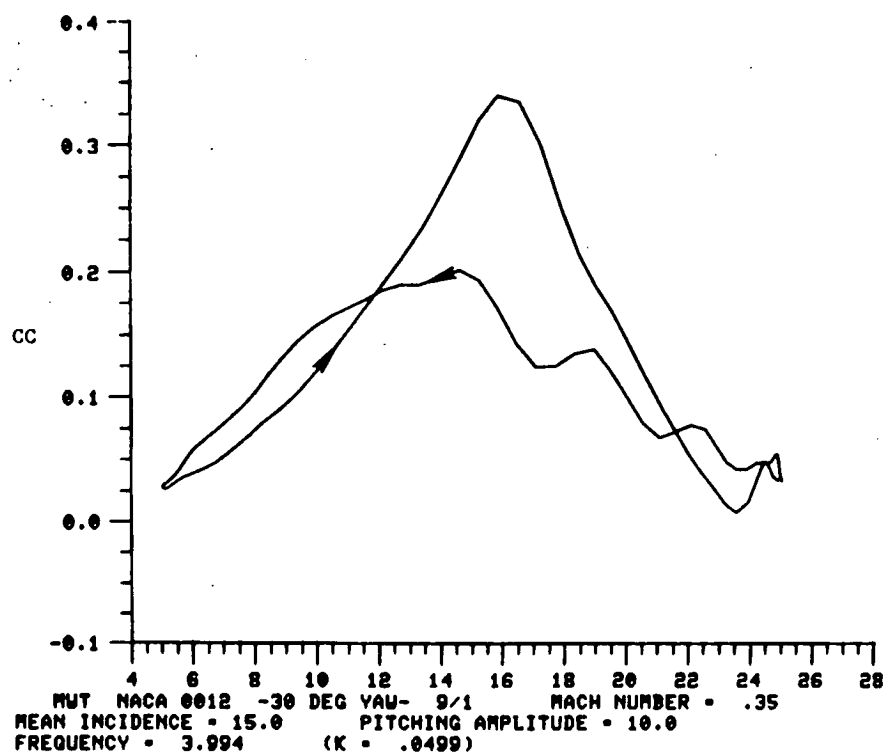


FILE 35. RUN1020.008

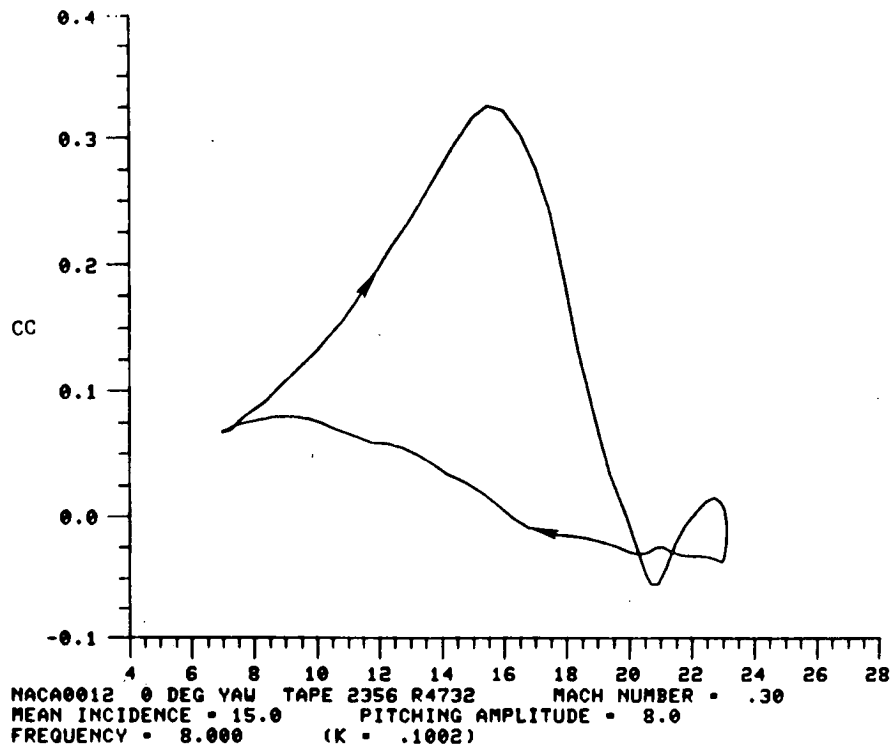


DATA WERE NOT OBTAINED

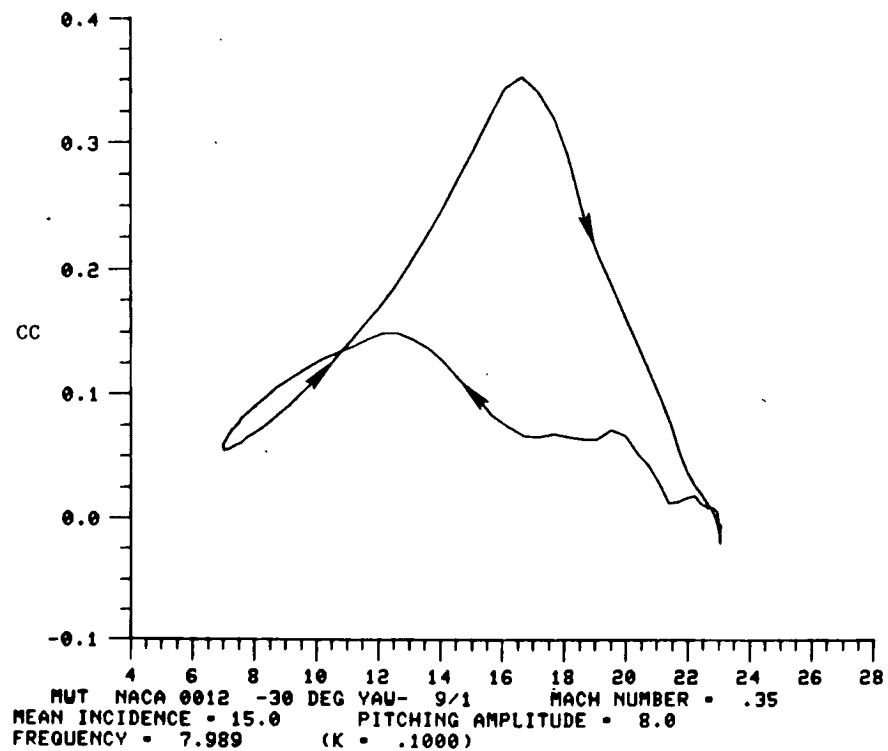
FILE 53. RUN1036.001



FILE 10. RUN 49.003

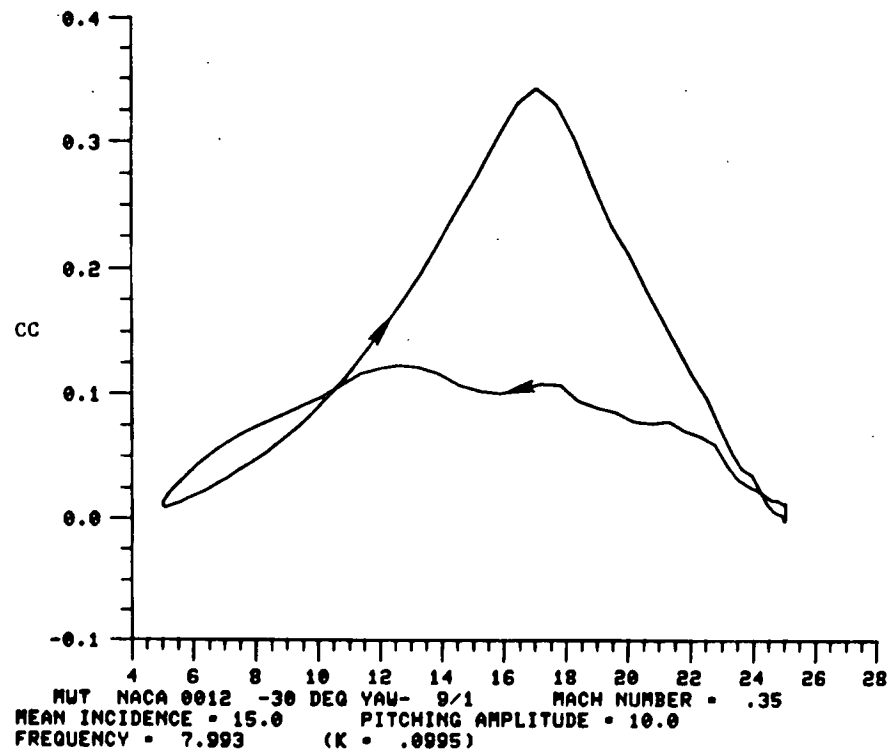


FILE 37. RUN1020.012

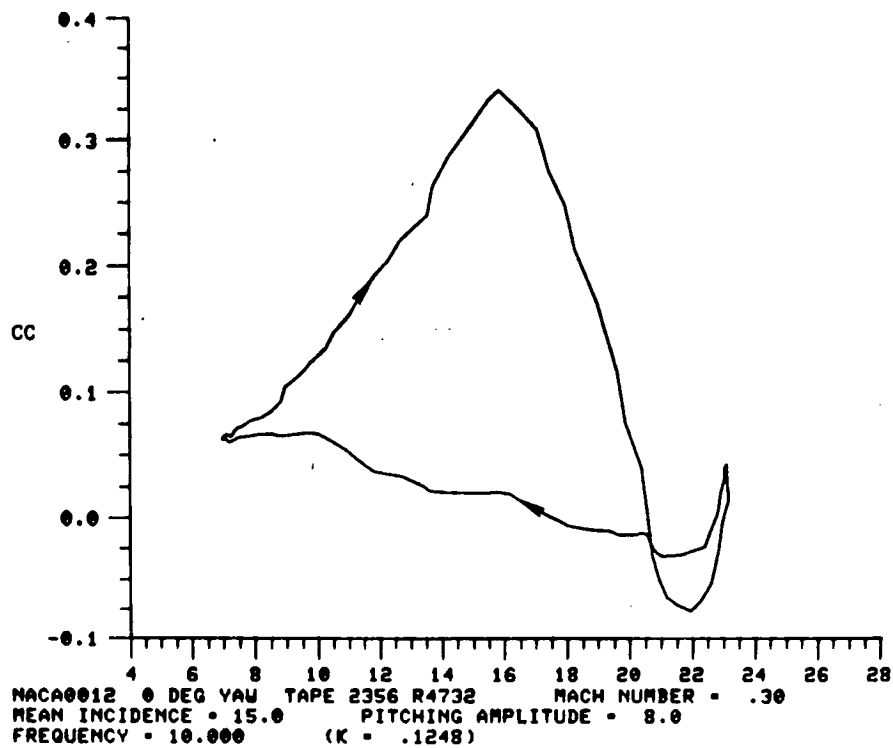


DATA WERE NOT OBTAINED

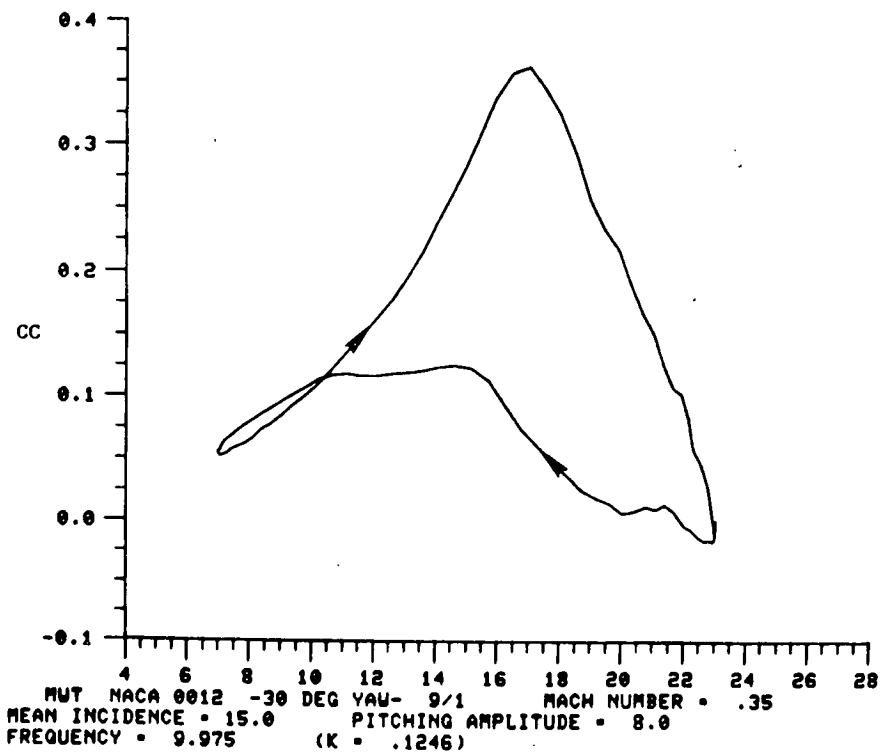
FILE 55. RUN1036.005



FILE 11. RUN 49.005

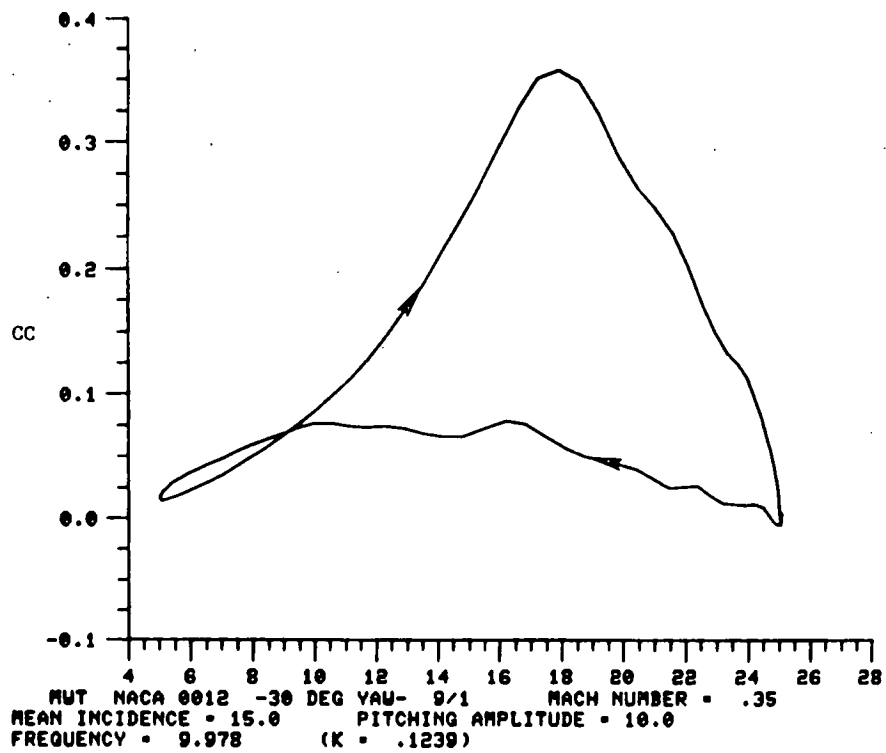


FILE 38. RUN1020.014

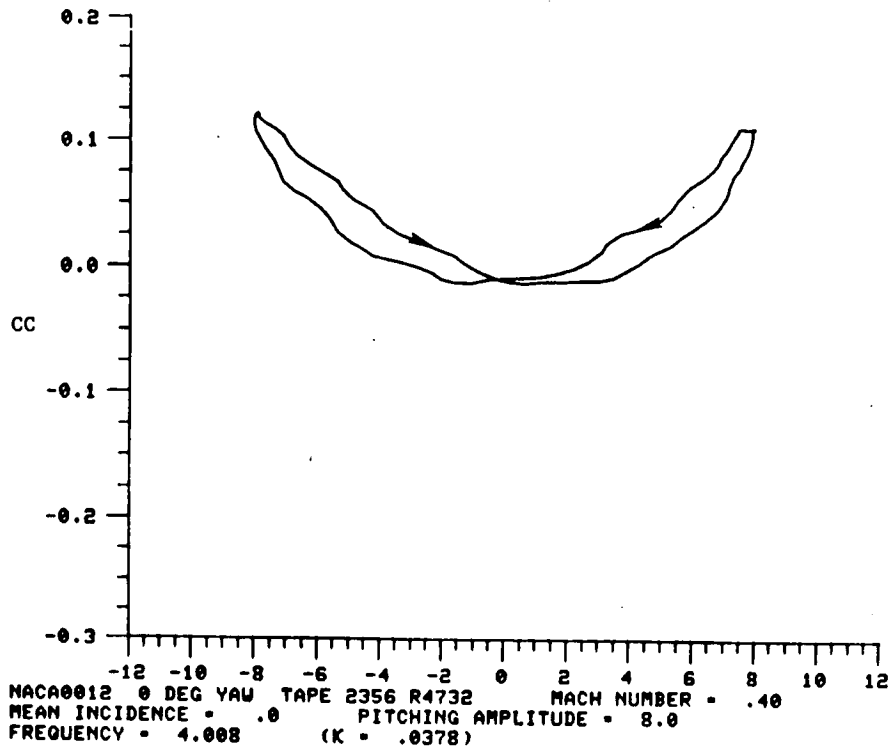


DATA WERE NOT OBTAINED

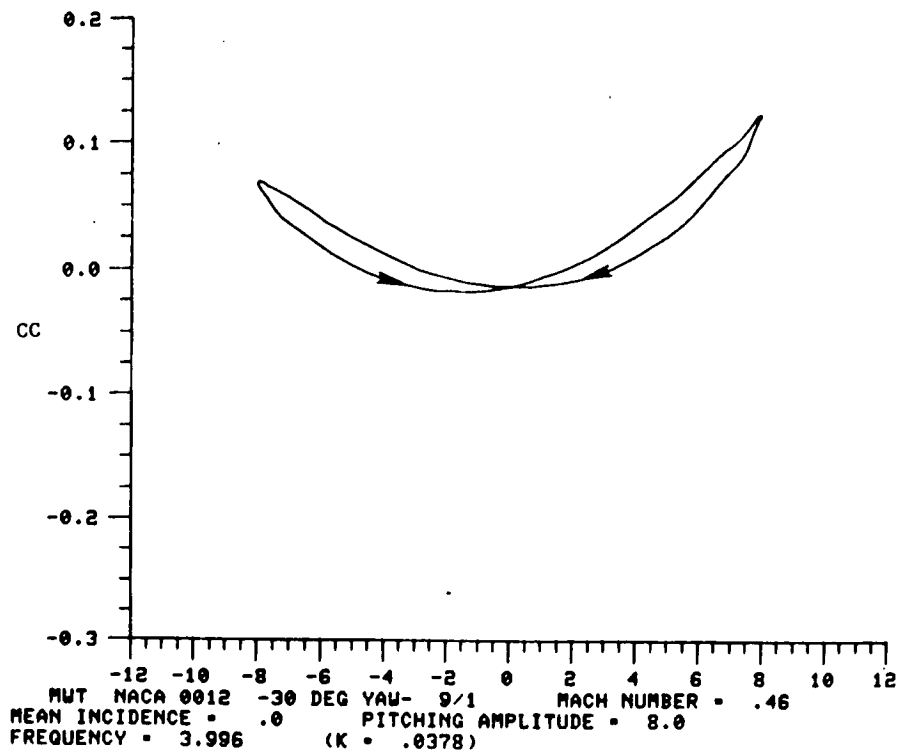
FILE 56. RUN1036.007



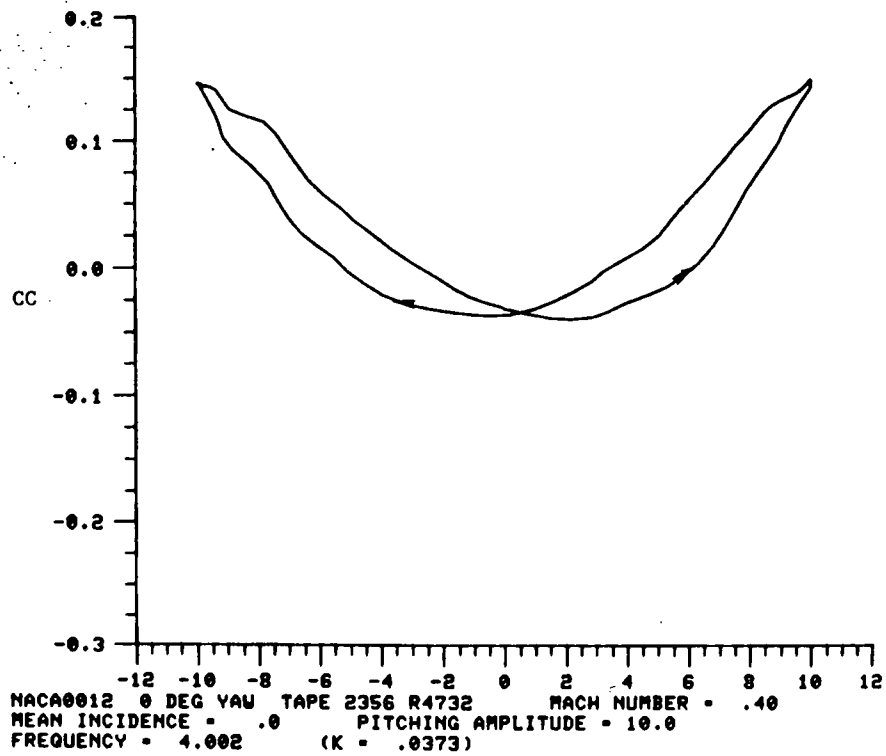
FILE 24. RUN 54.001



FILE 12. RUN1008.001

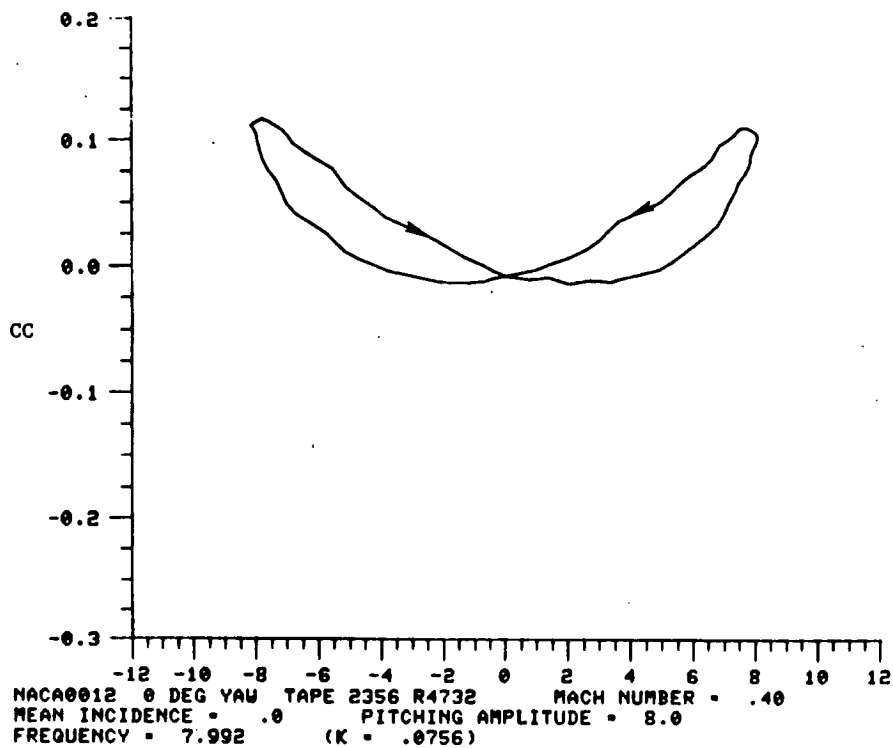


FILE 30. RUN 58.001

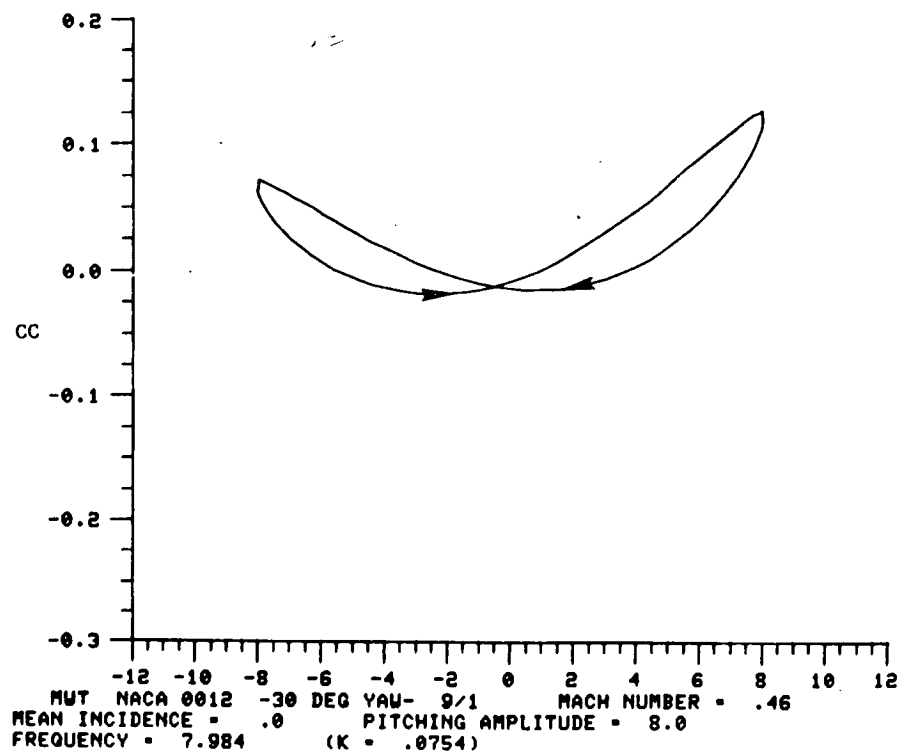


DATA WERE NOT OBTAINED

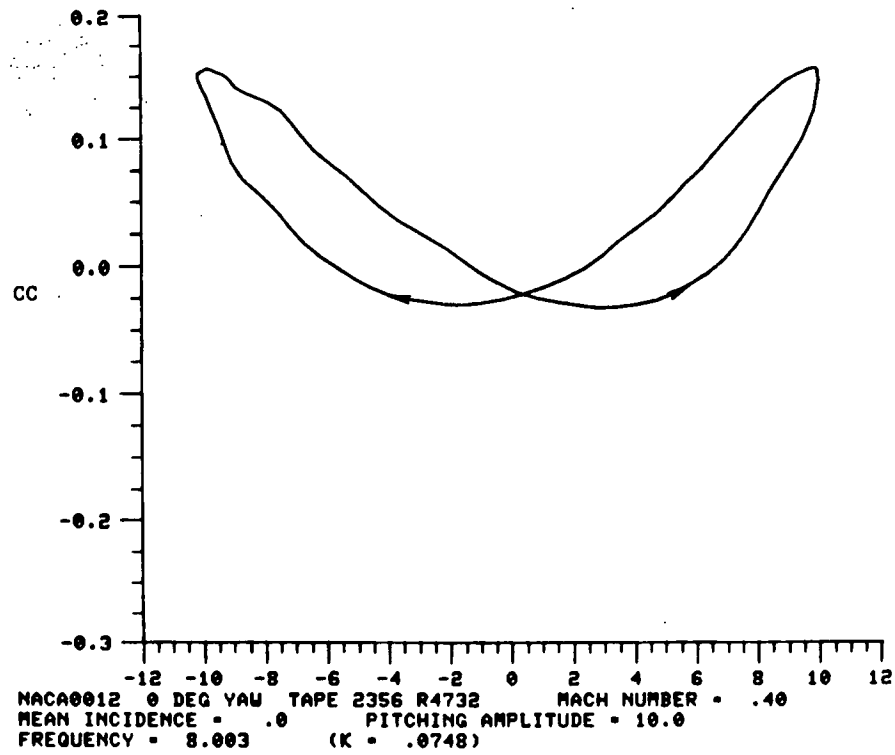
FILE 25. RUN 54.003



FILE 14. RUN1008.005

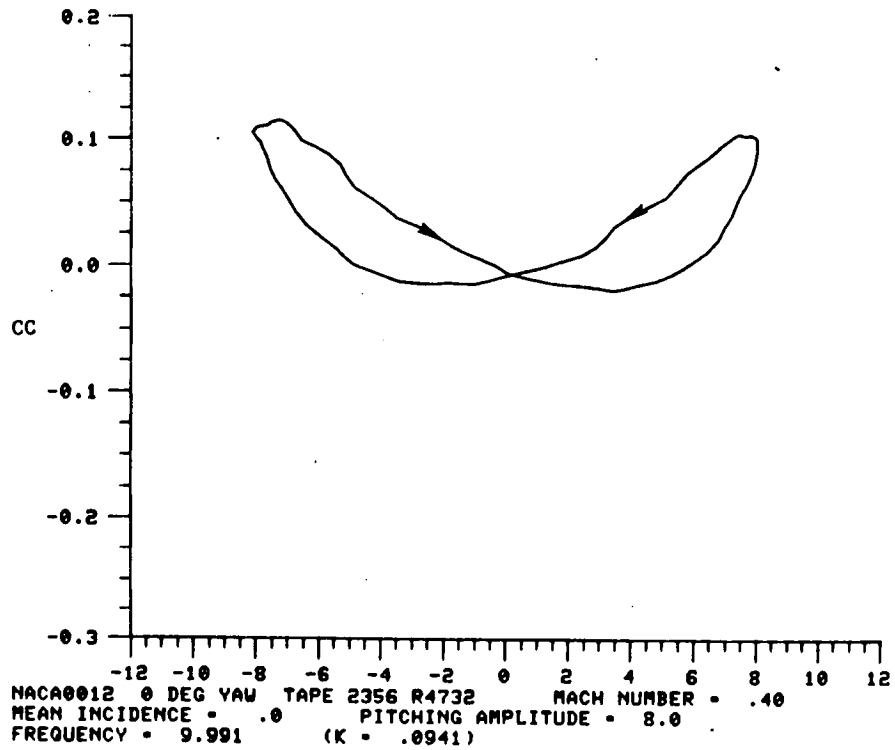


FILE 31. RUN 58.003

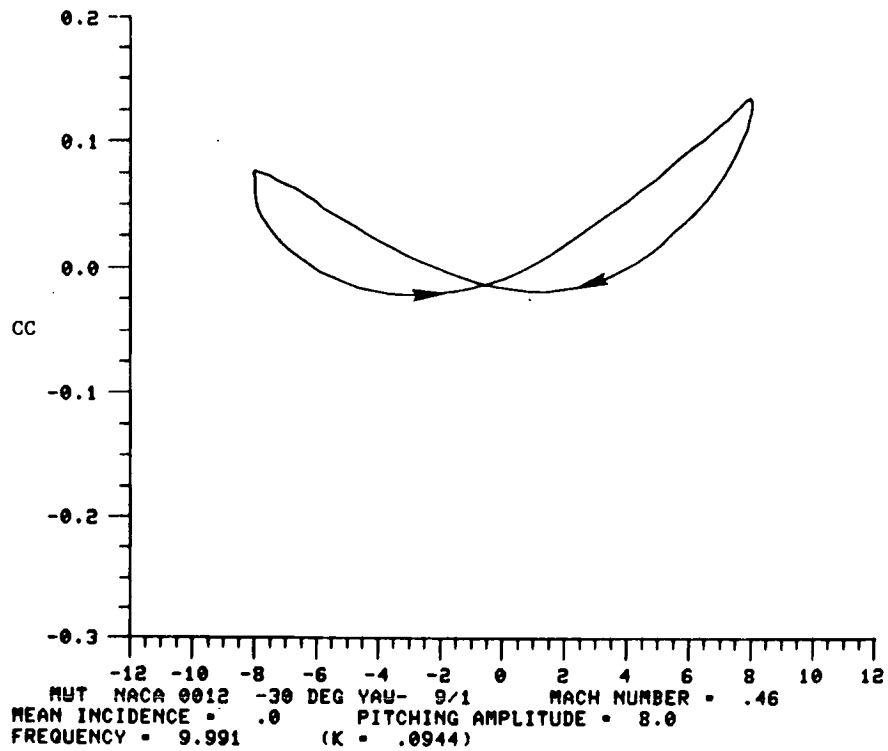


DATA WERE NOT OBTAINED

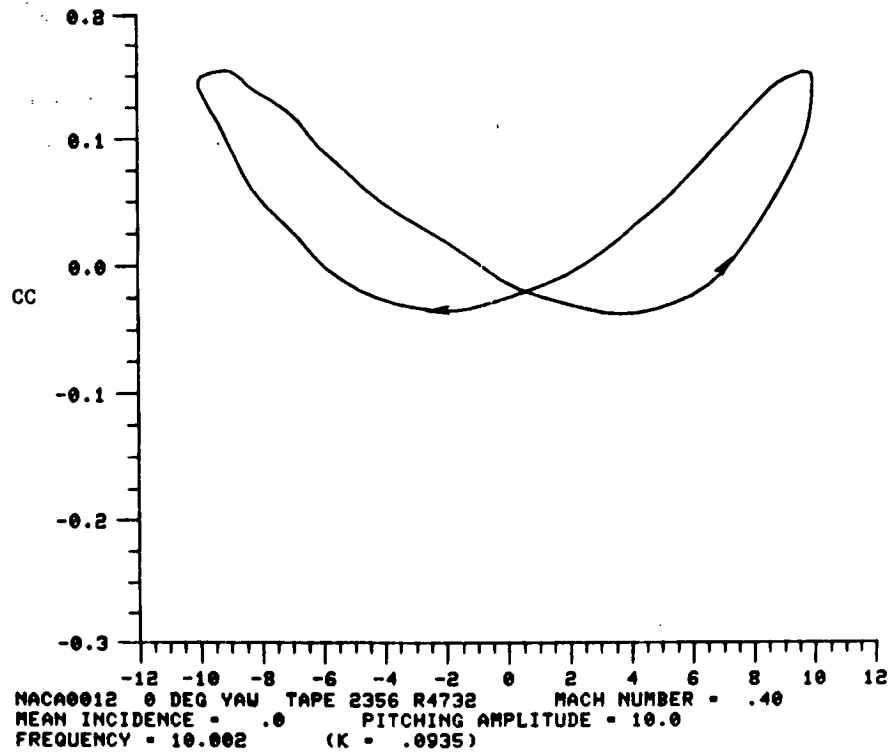
FILE 26. RUN 54.005



FILE 48. RUN1008.007

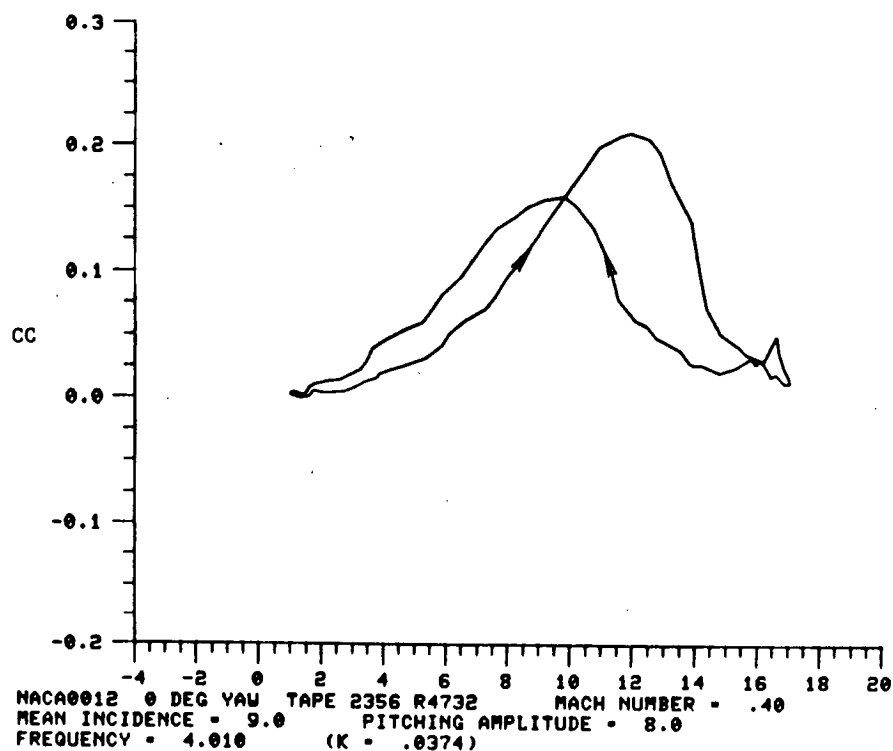


FILE 32. RUN 58.005

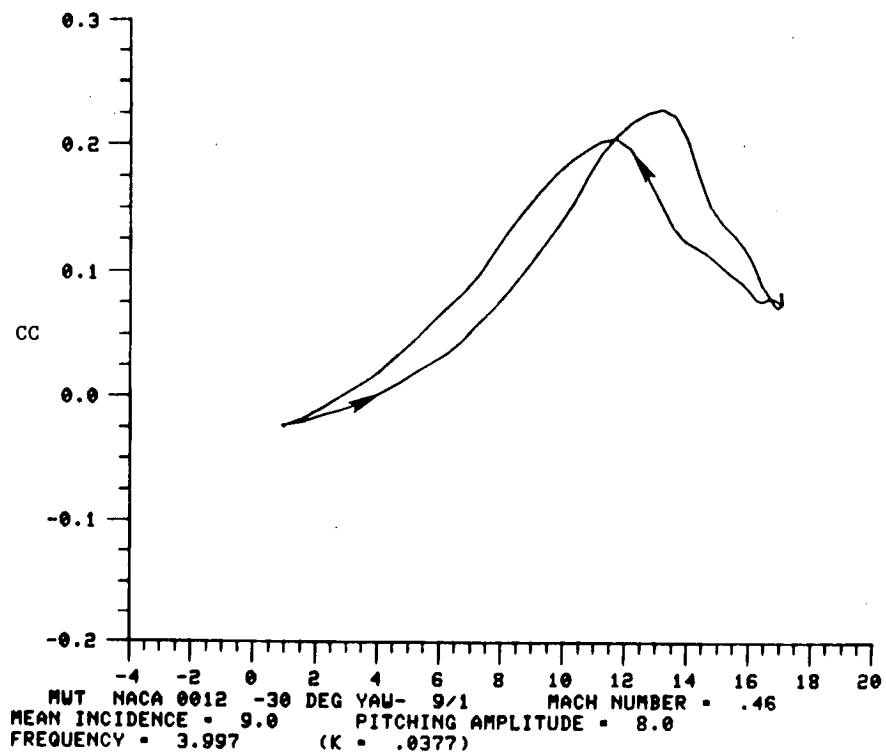


DATA WERE NOT OBTAINED

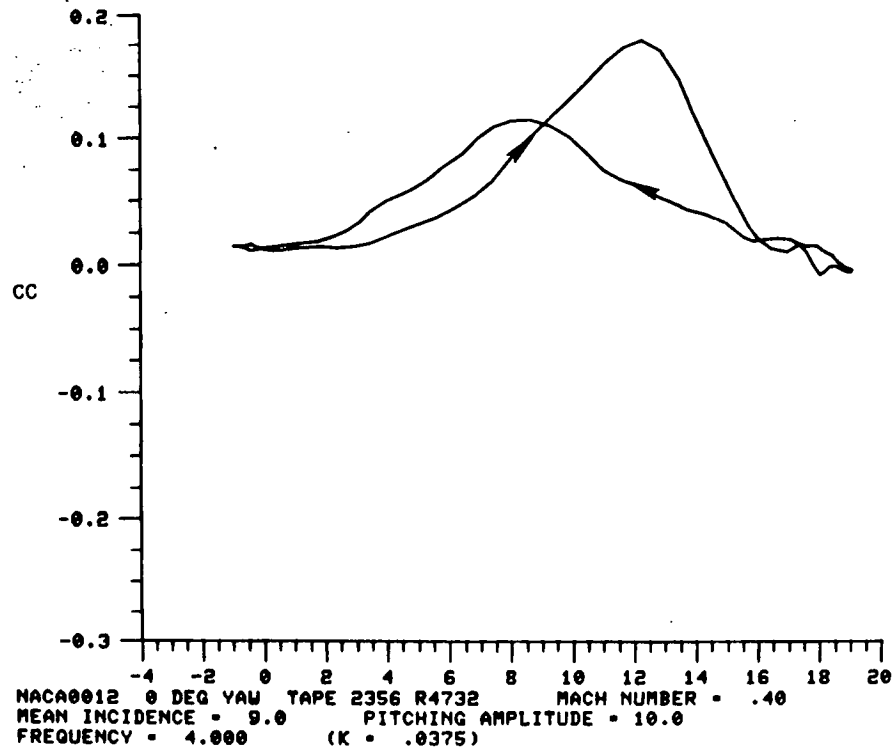
FILE 6. RUN 48.001



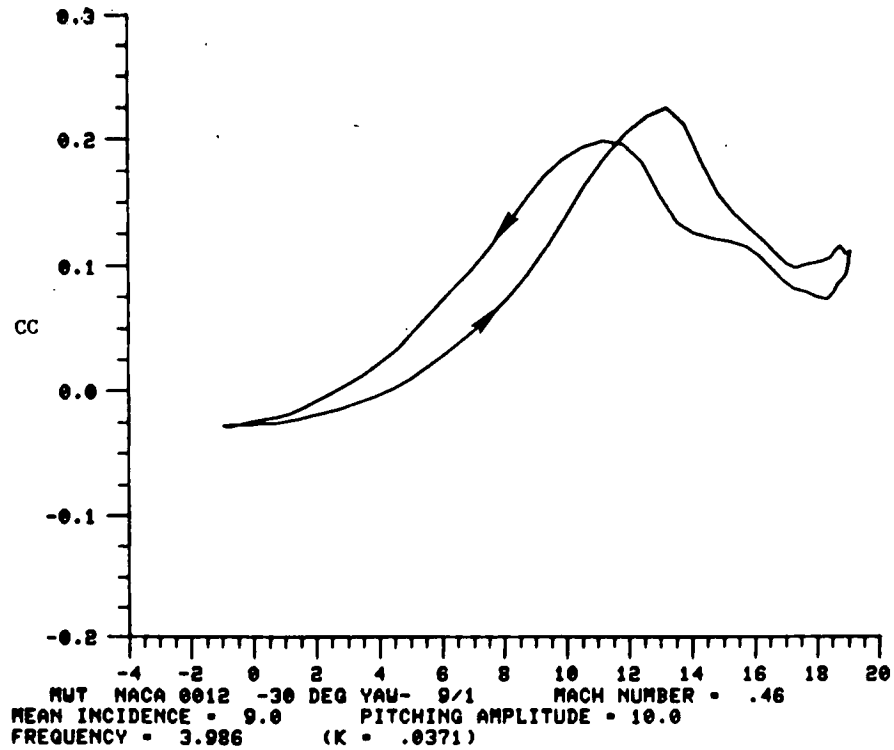
FILE 30. RUN1019.001



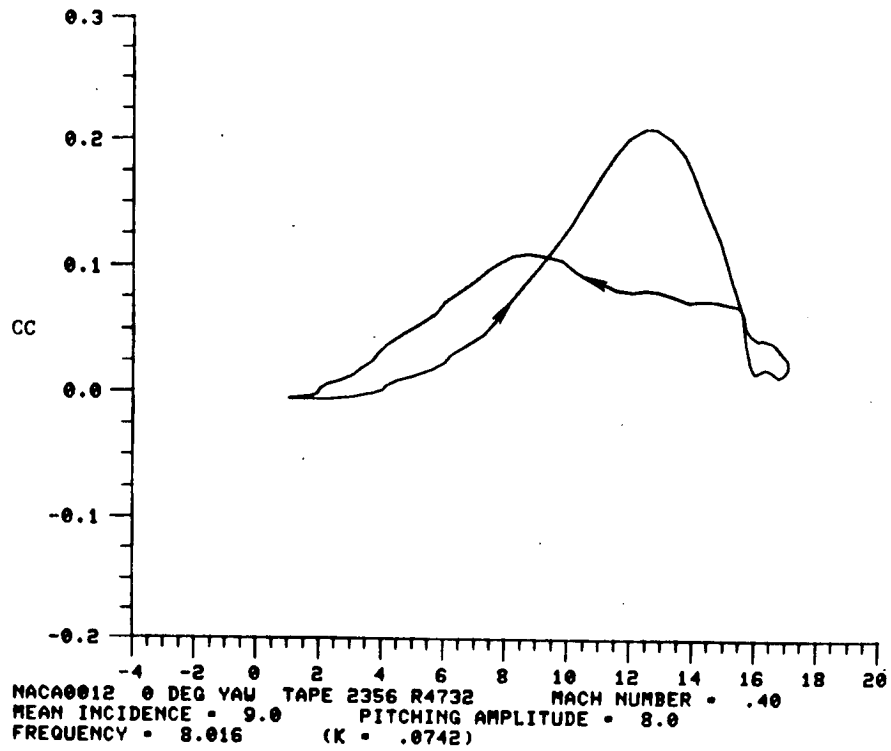
FILE 42. RUN 62.002



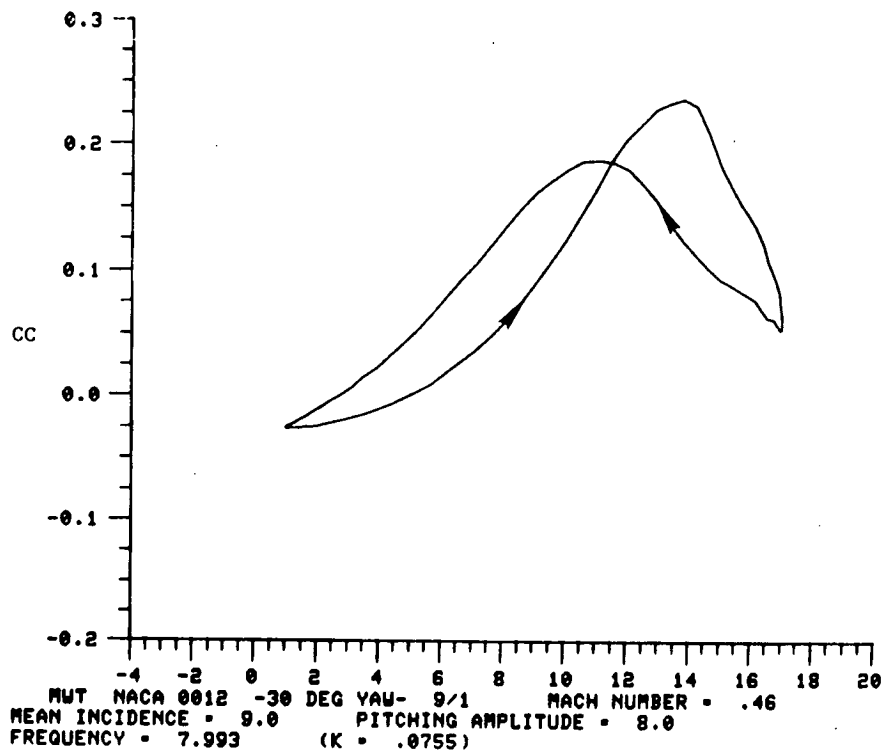
FILE 10. RUN3030.001



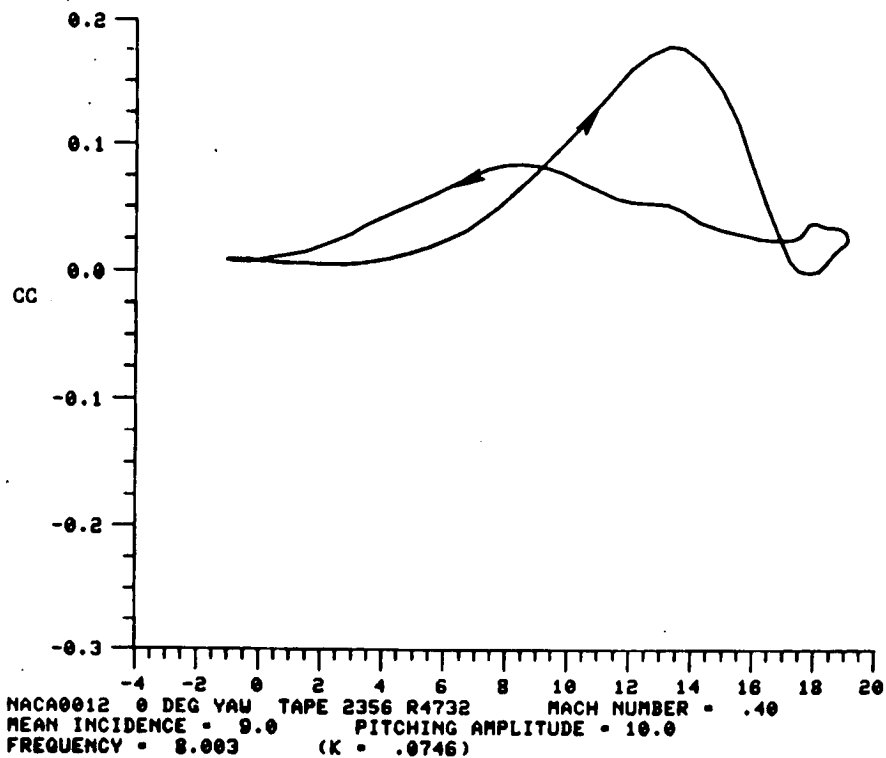
FILE 7. RUN 48.003



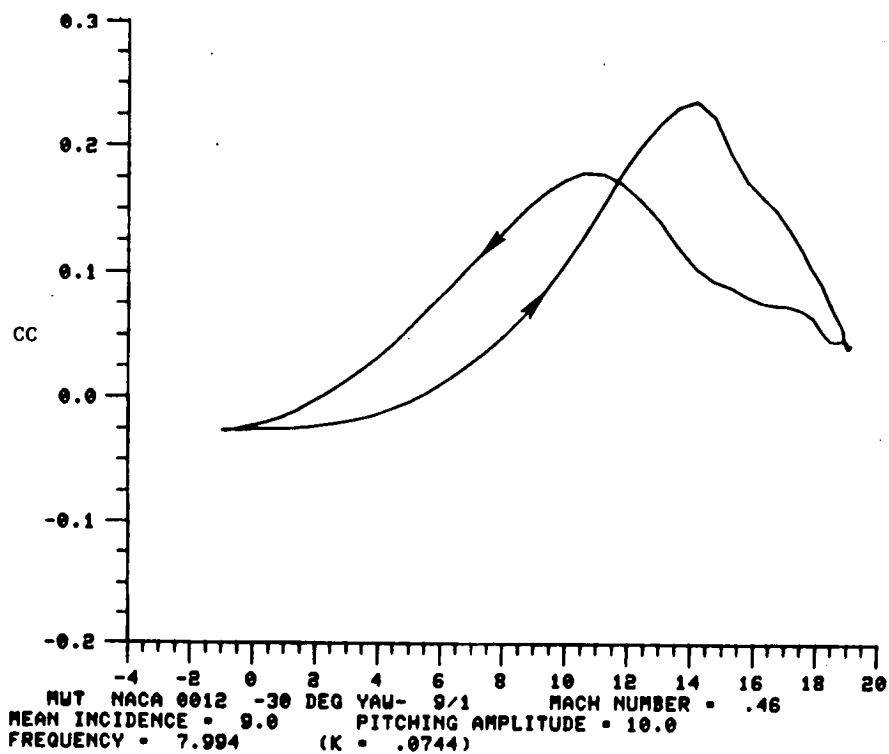
FILE 32. RUN1019.005



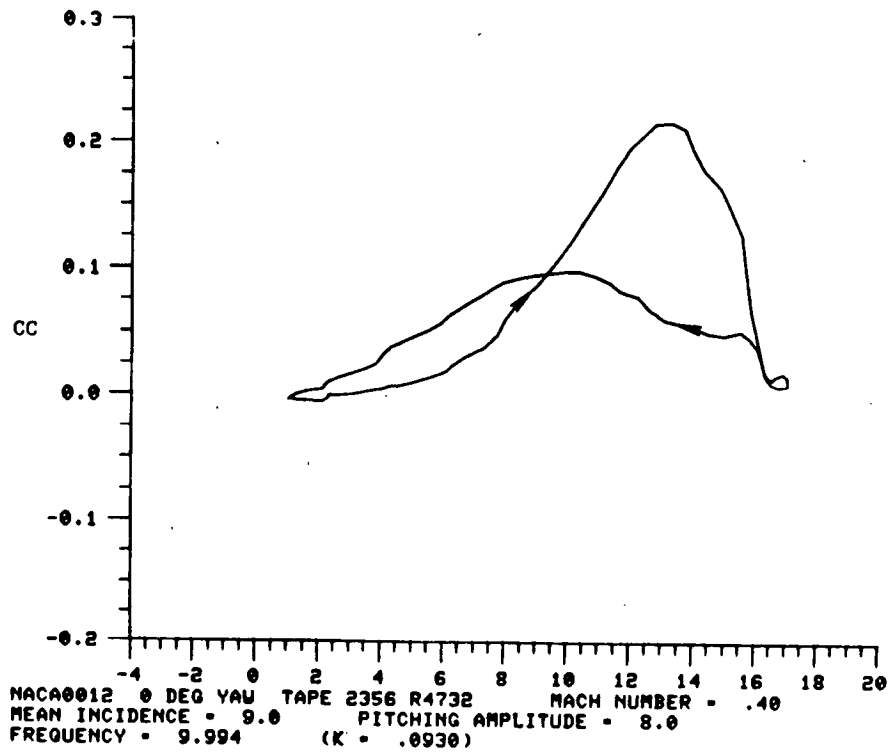
FILE 43. RUN 62.004



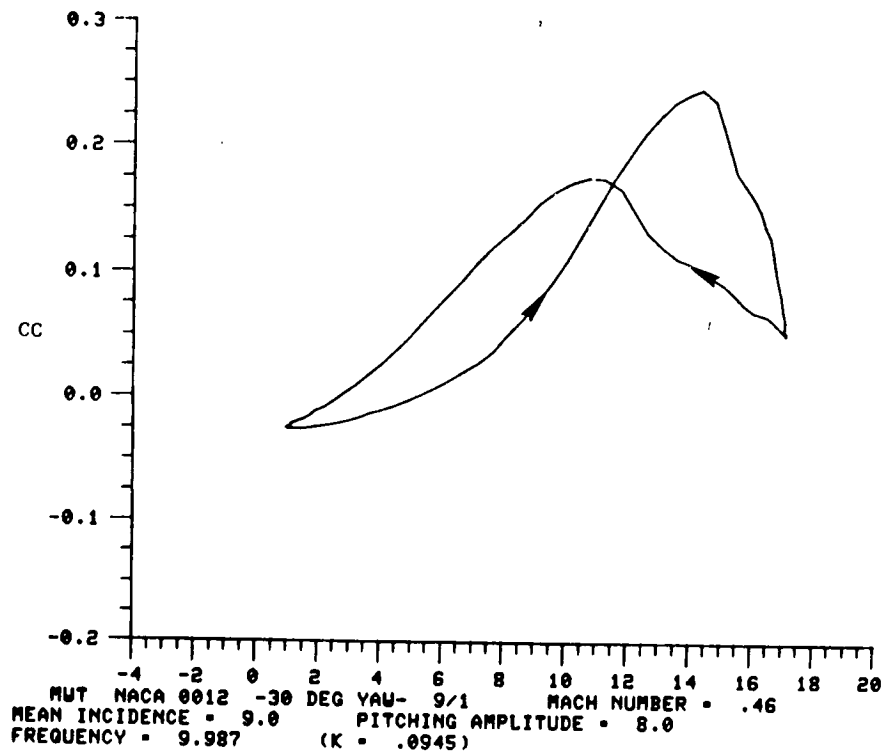
FILE 12. RUN1030.005



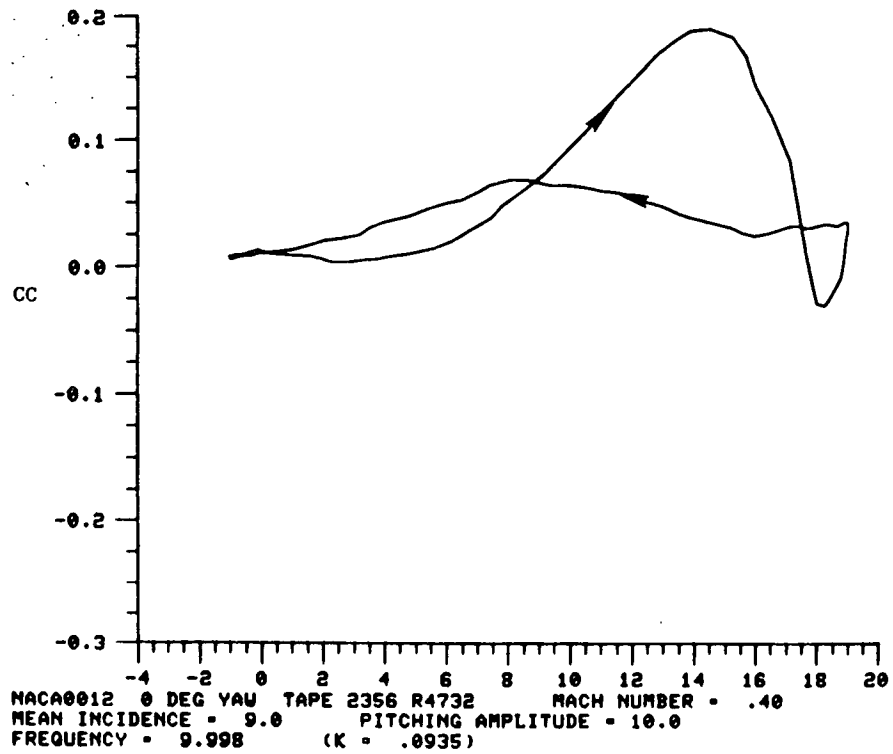
FILE 8. RUN 48.005



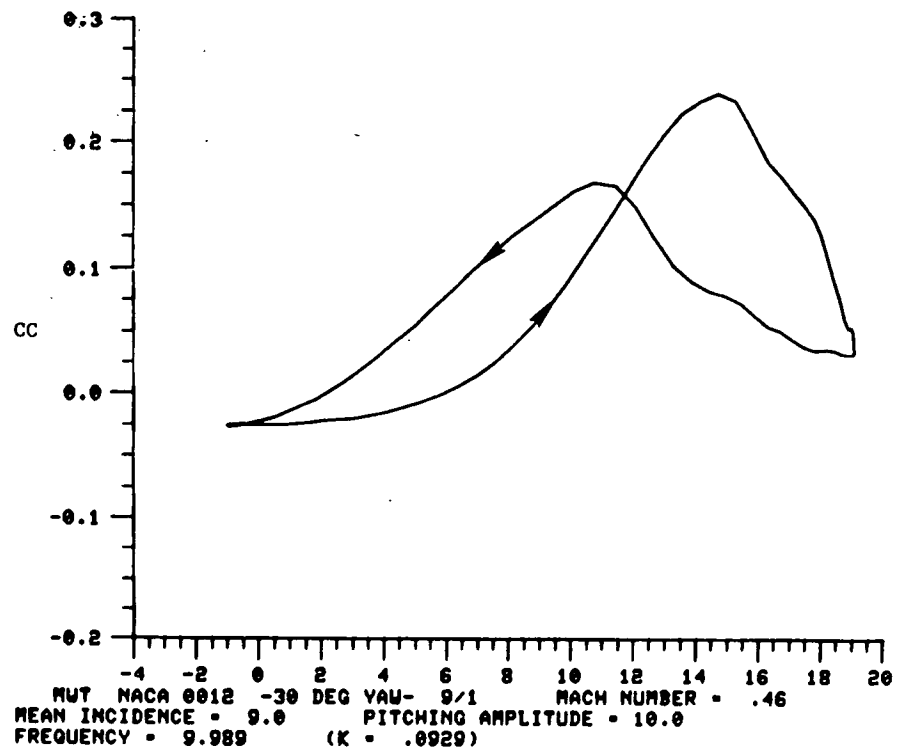
FILE 33. RUN1019.007



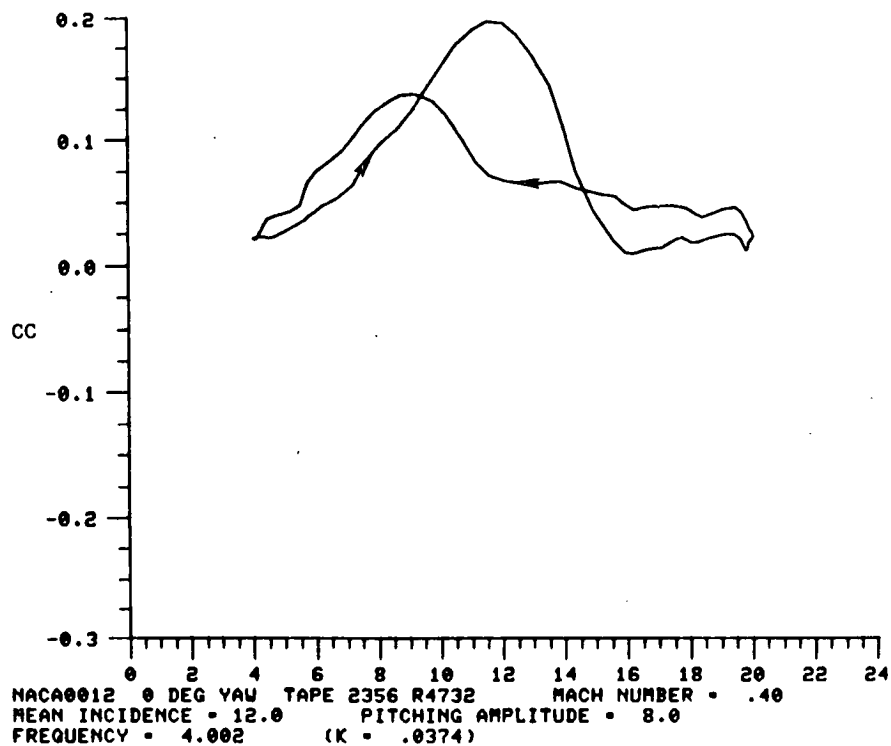
FILE 44. RUN 62.006



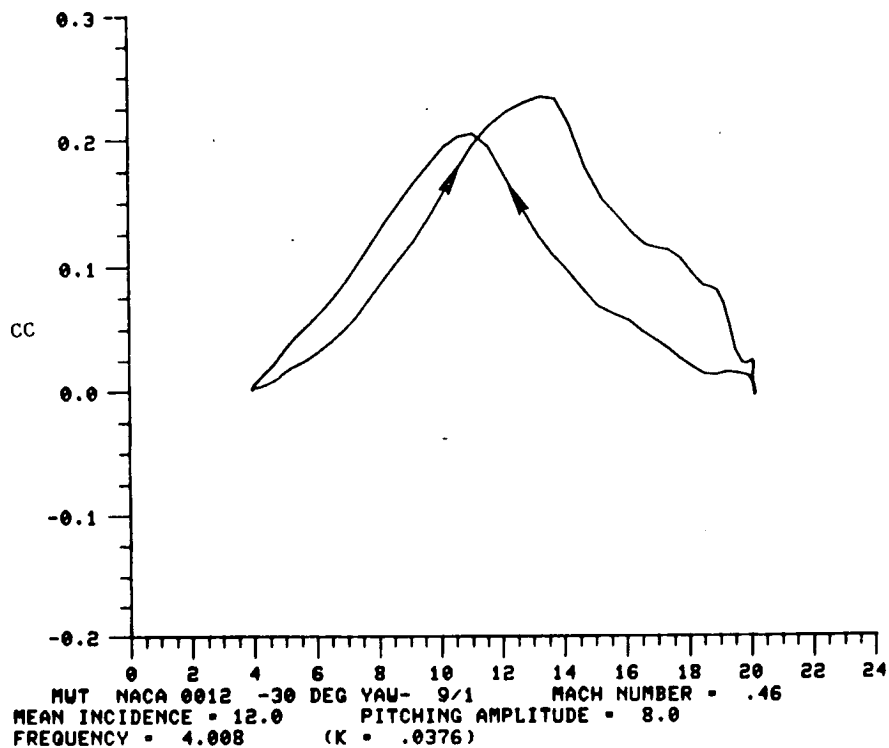
FILE 13. RUN1030.007



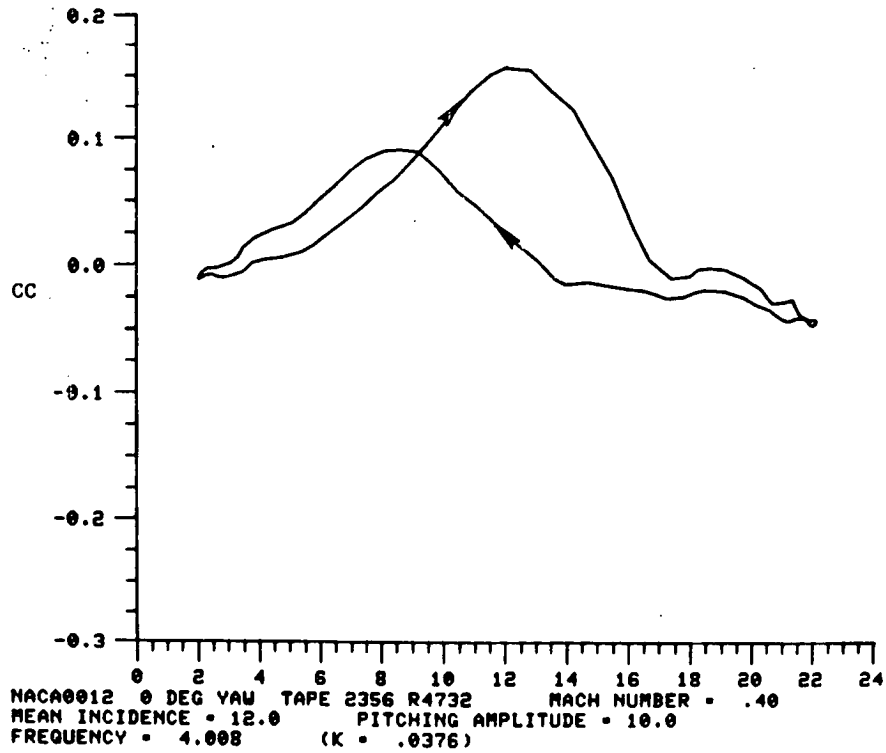
FILE 18. RUN 52.001



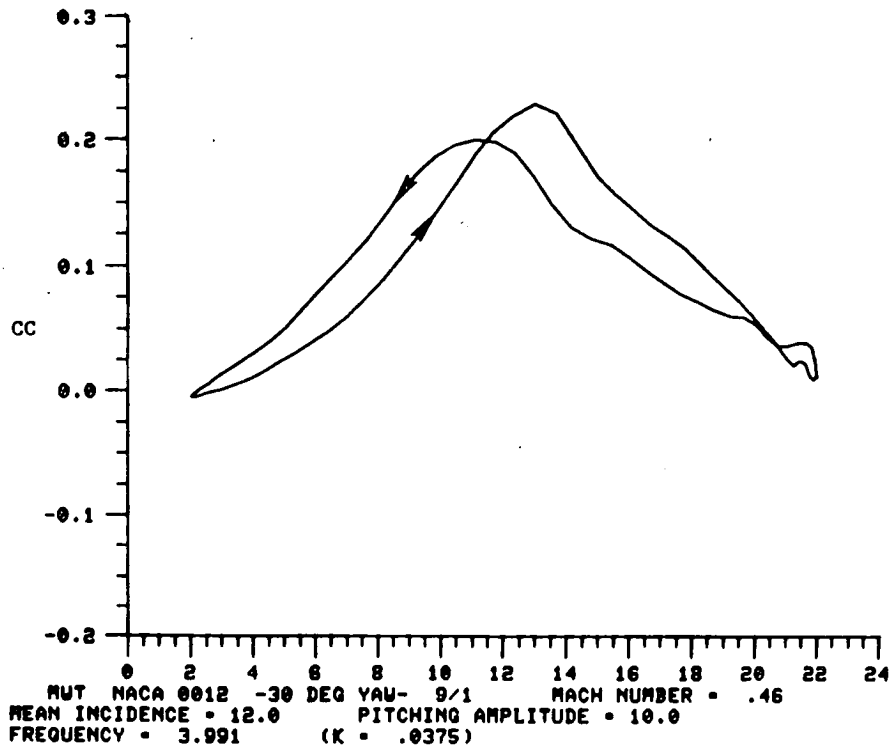
FILE 55. RUN1017.001



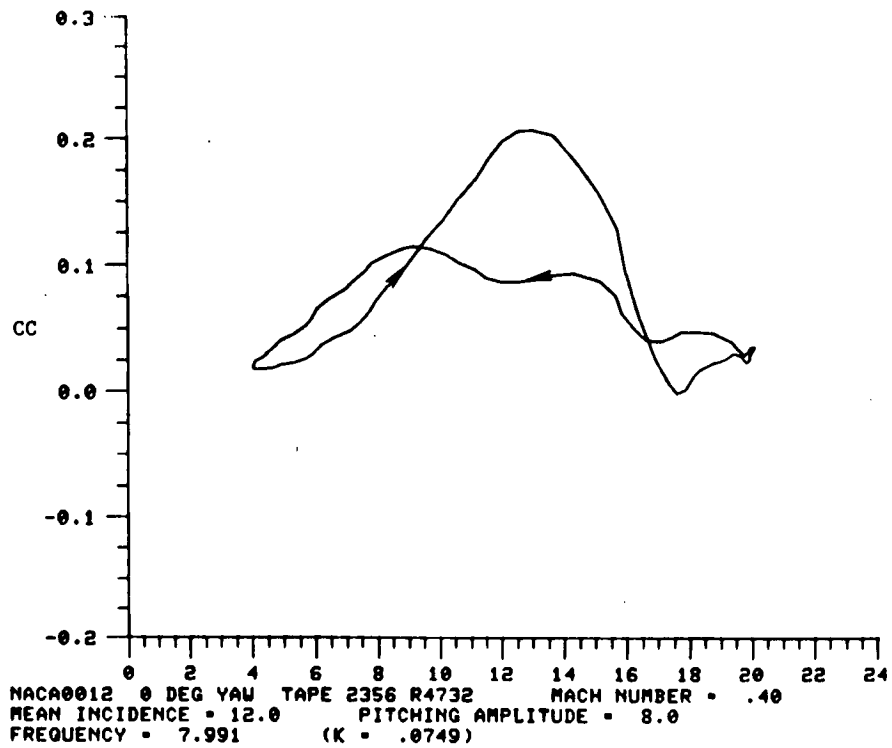
FILE 38. RUN 60.001



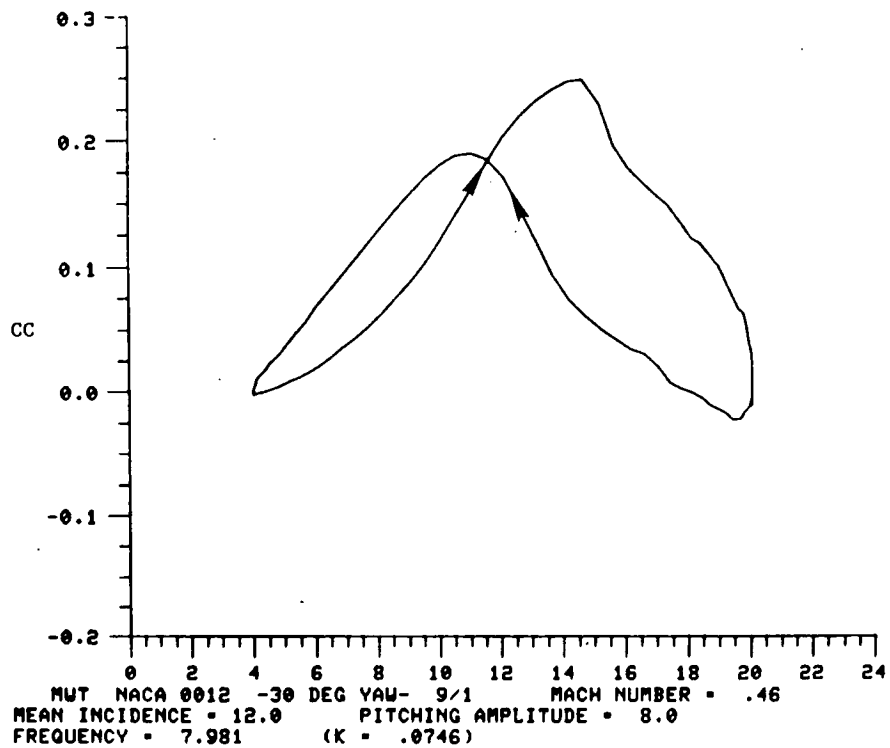
FILE 43. RUN1034.001



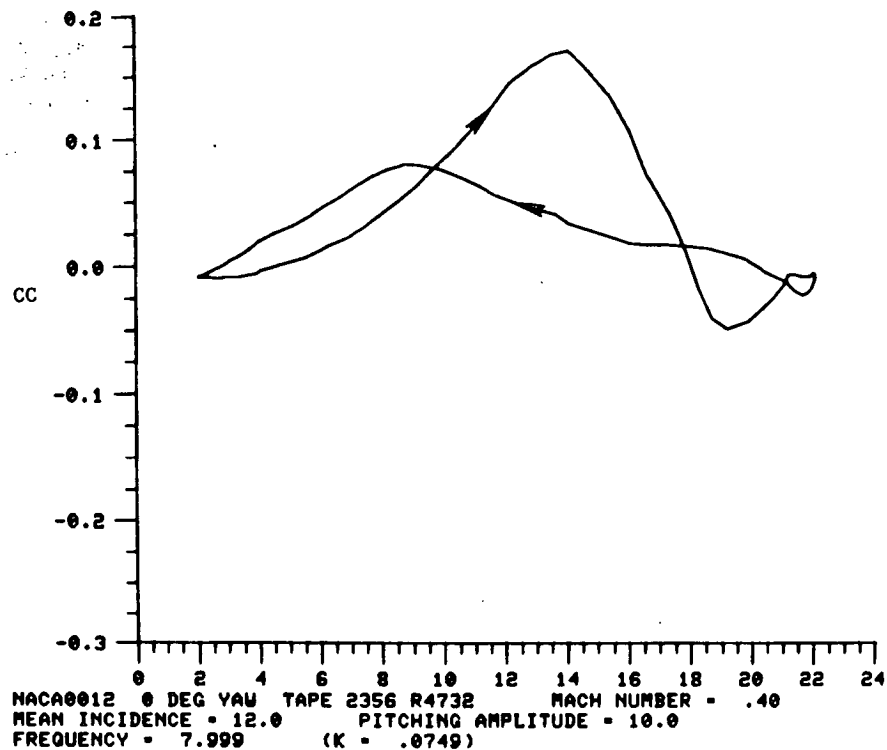
FILE 19. RUN 52.003



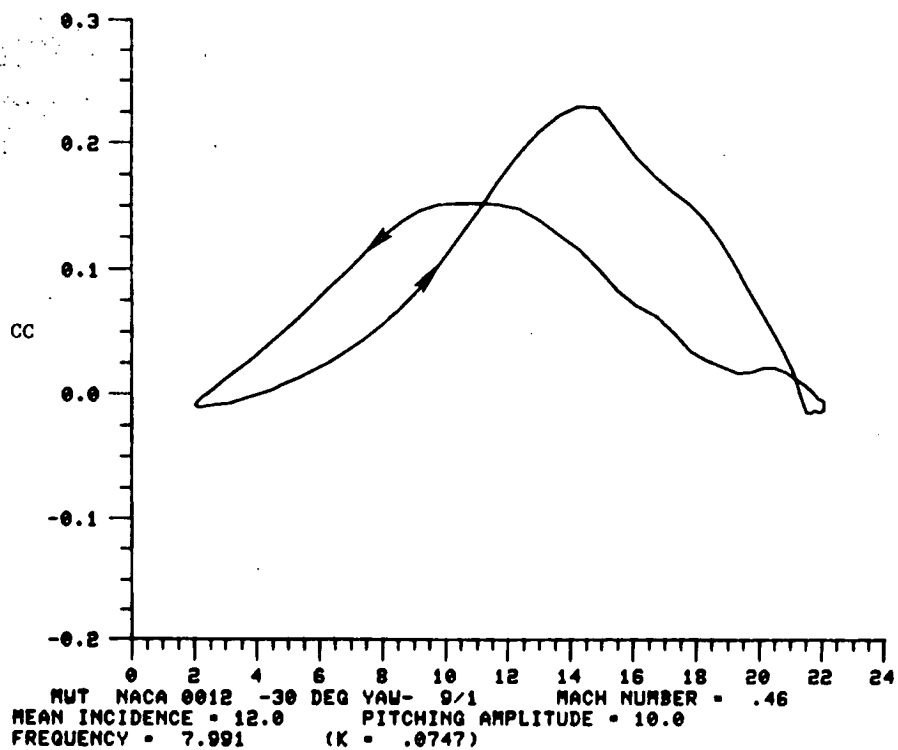
FILE 57. RUN1017.005



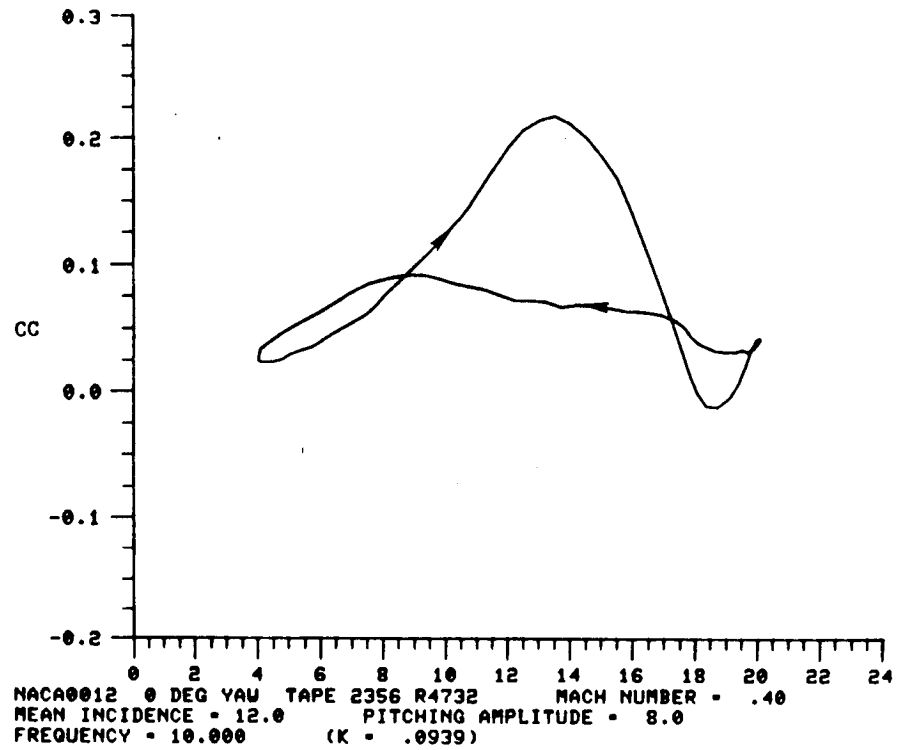
FILE 37. RUN 60.003



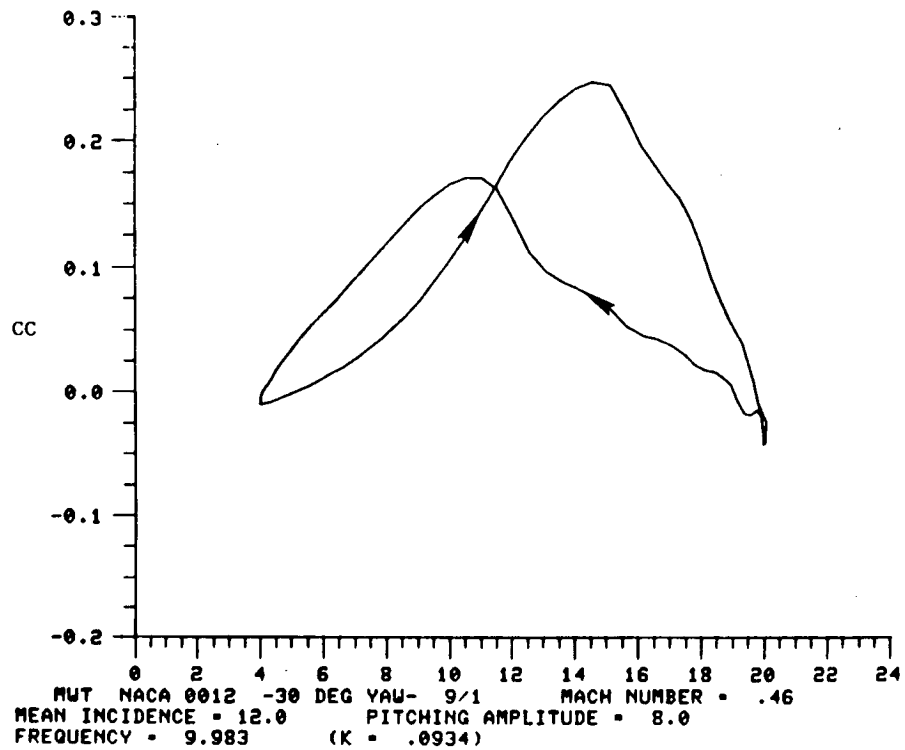
FILE 45. RUN1034.005



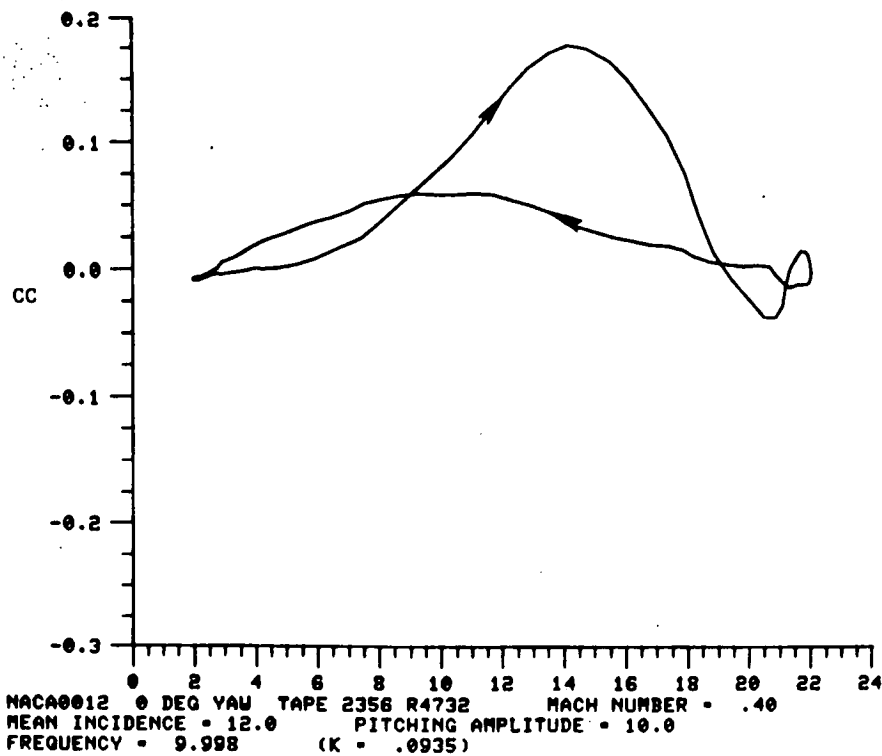
FILE 20. RUN 52.005



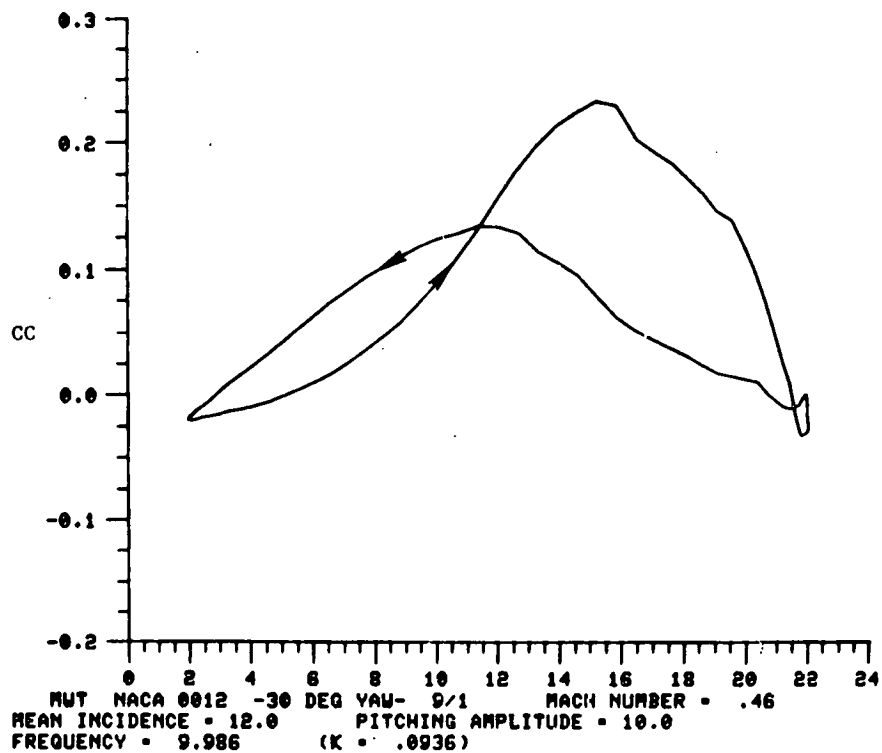
FILE 21. RUN3017.007



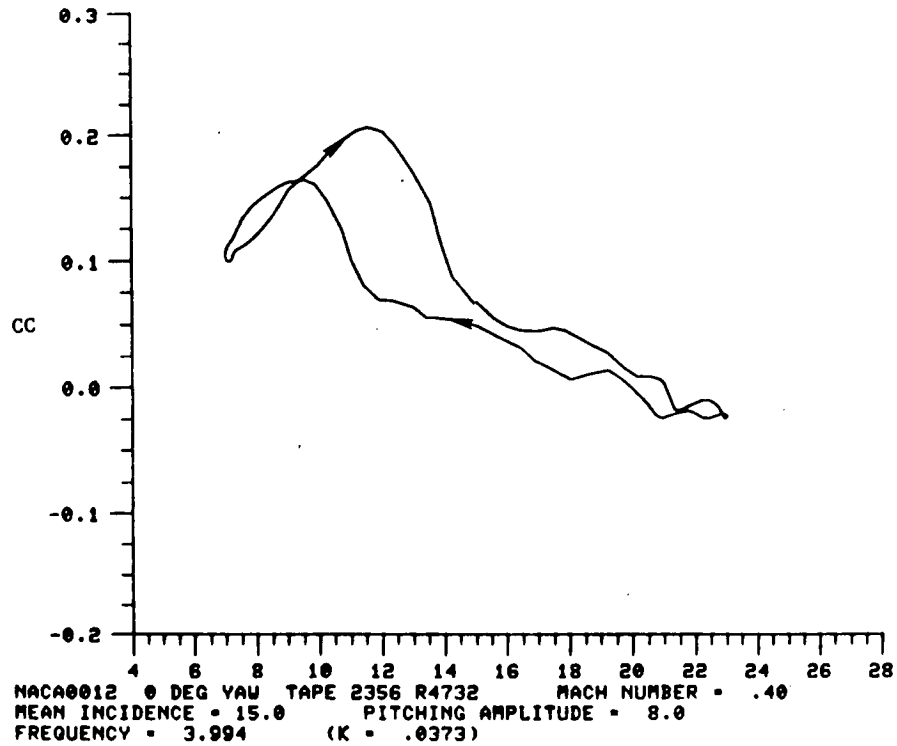
FILE 38. RUN 60.005



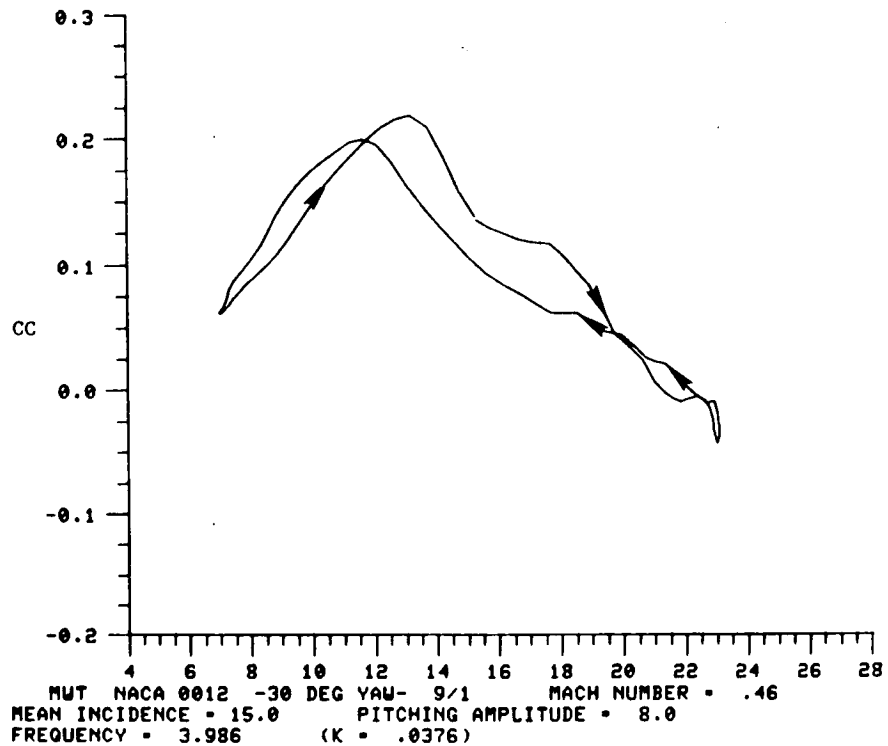
FILE 46. RUN1034.007



FILE 12. RUN 50.001

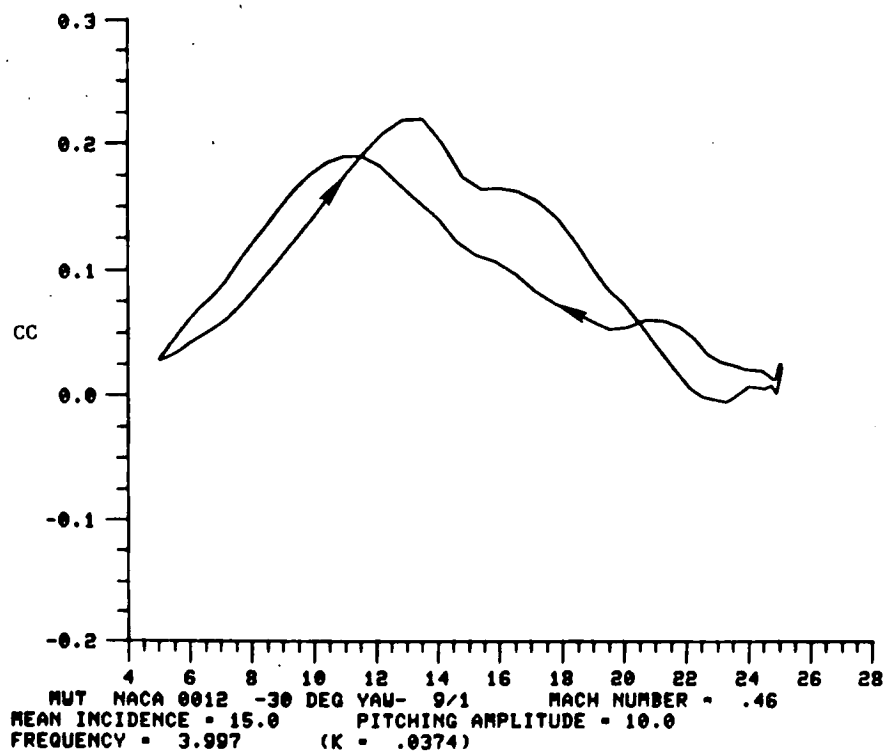


FILE 39. RUN3021.001

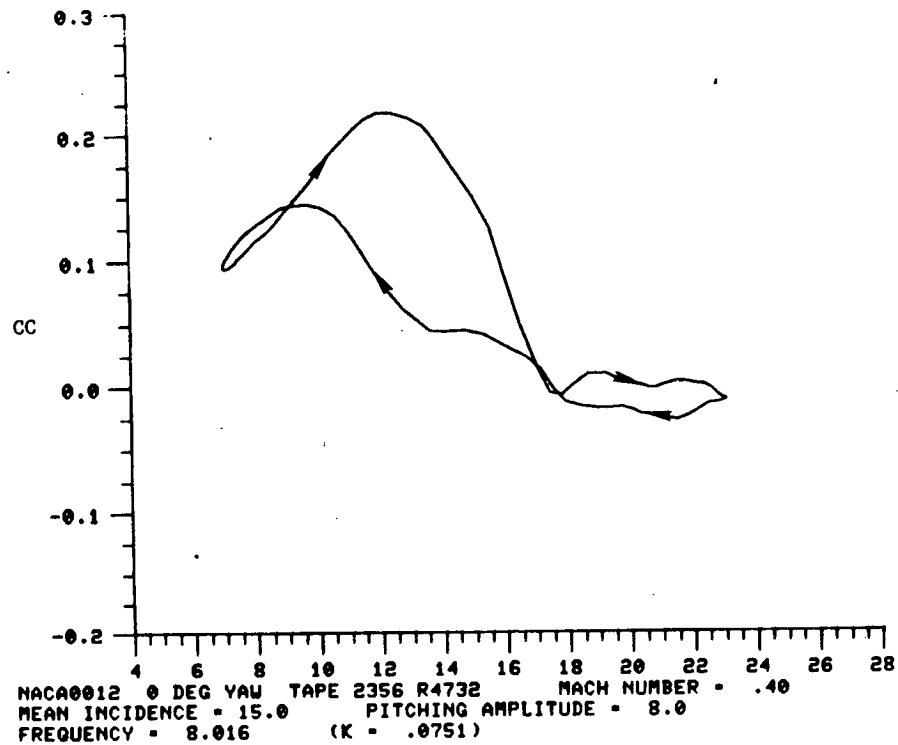


DATA WERE NOT OBTAINED

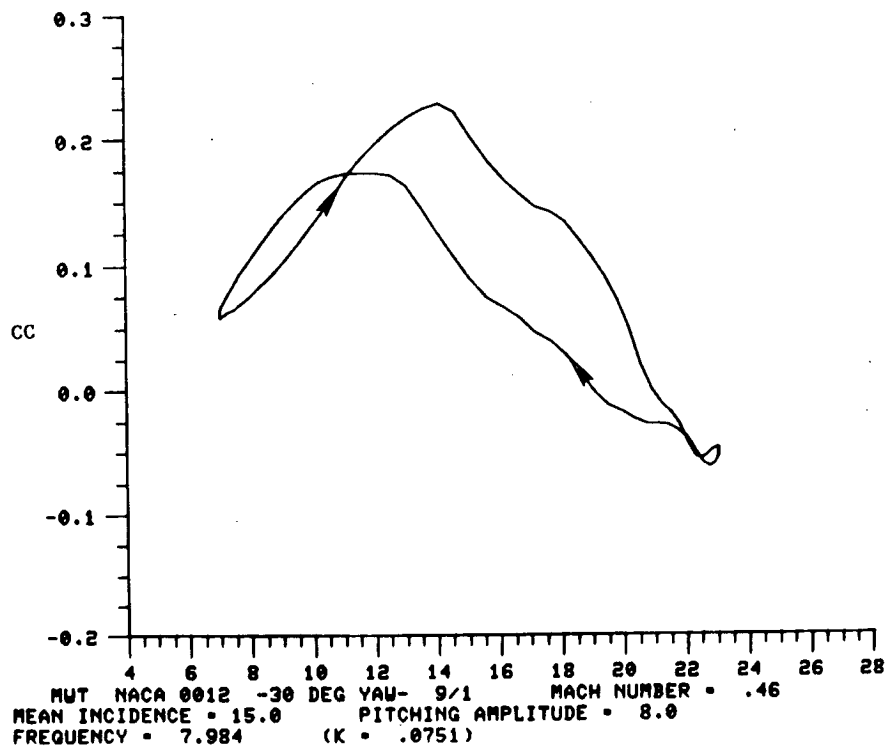
FILE 57. RUN1037.001



FILE 13. RUN 50.004

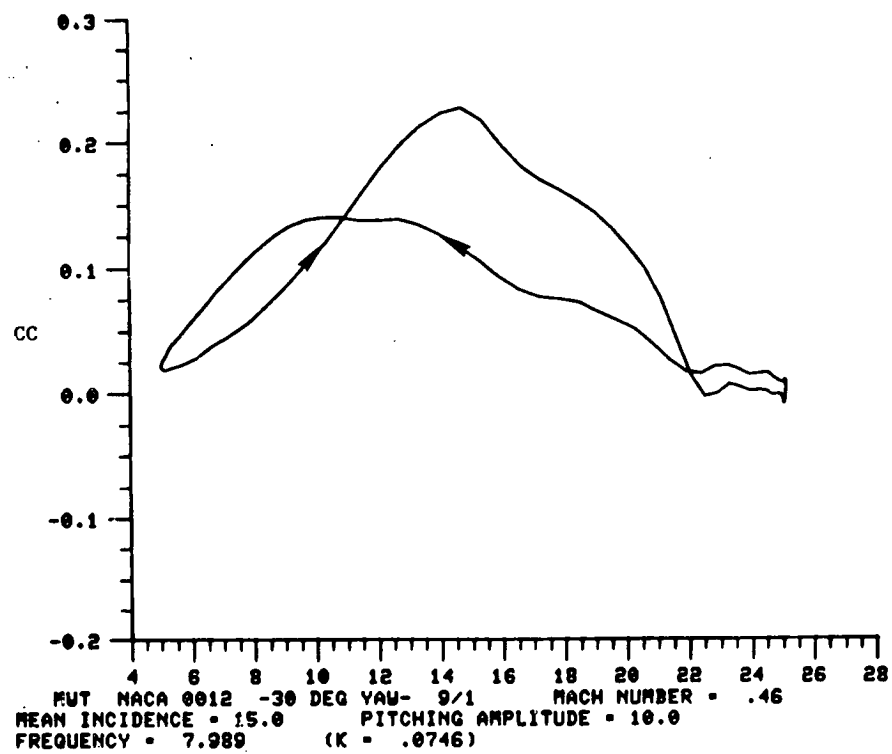


FILE 63. RUN1021.005

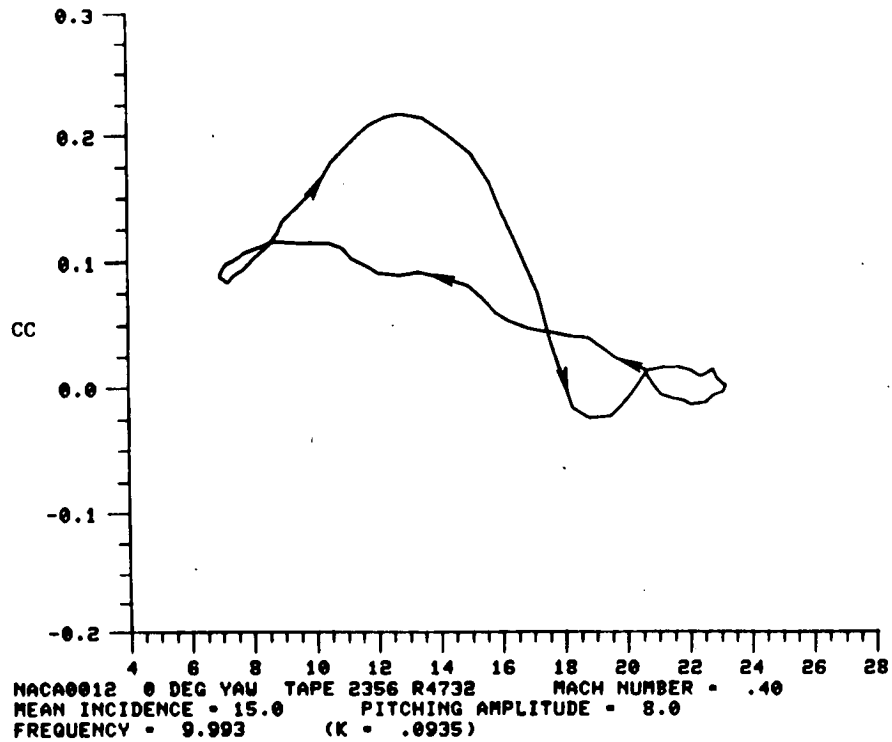


DATA WERE NOT OBTAINED

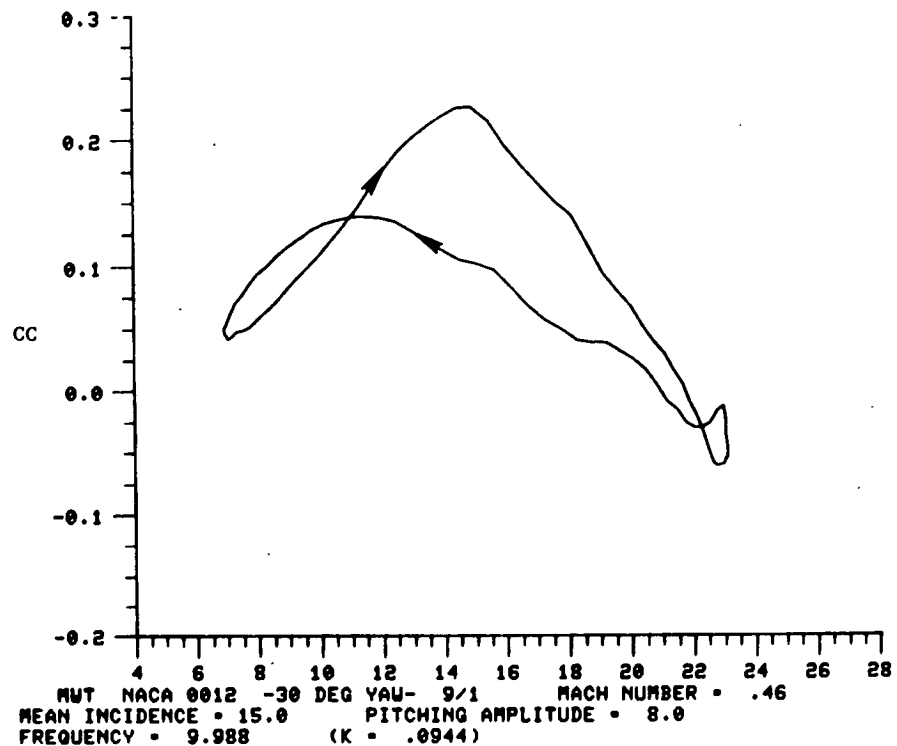
FILE 59. RUN1037.005



FILE 14. RUN 50.006

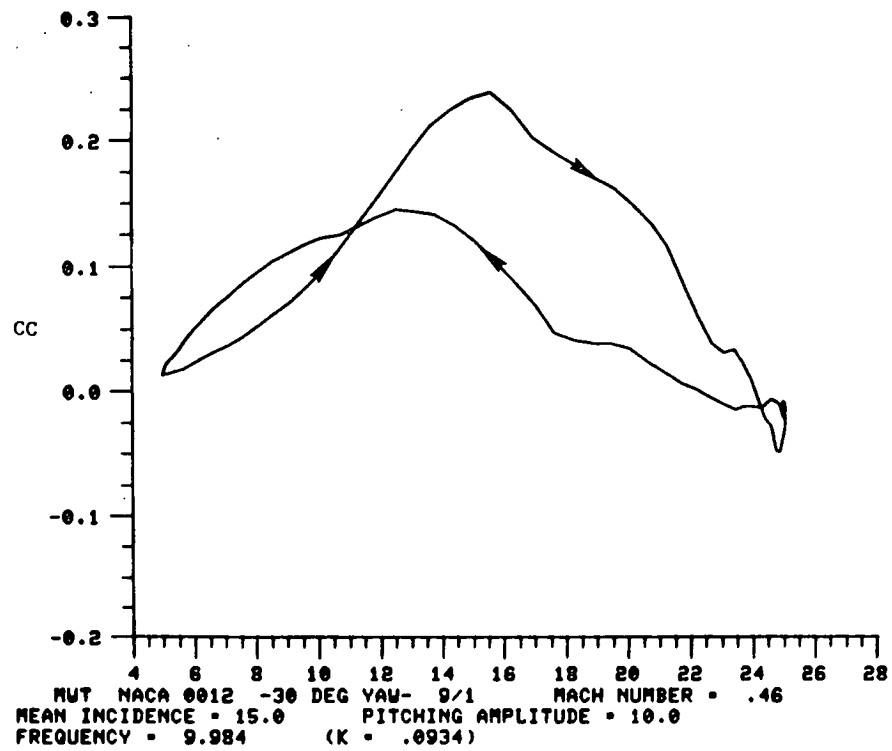


FILE 64. RUN1021.008



DATA WERE NOT OBTAINED

FILE 60. RUN1037.007

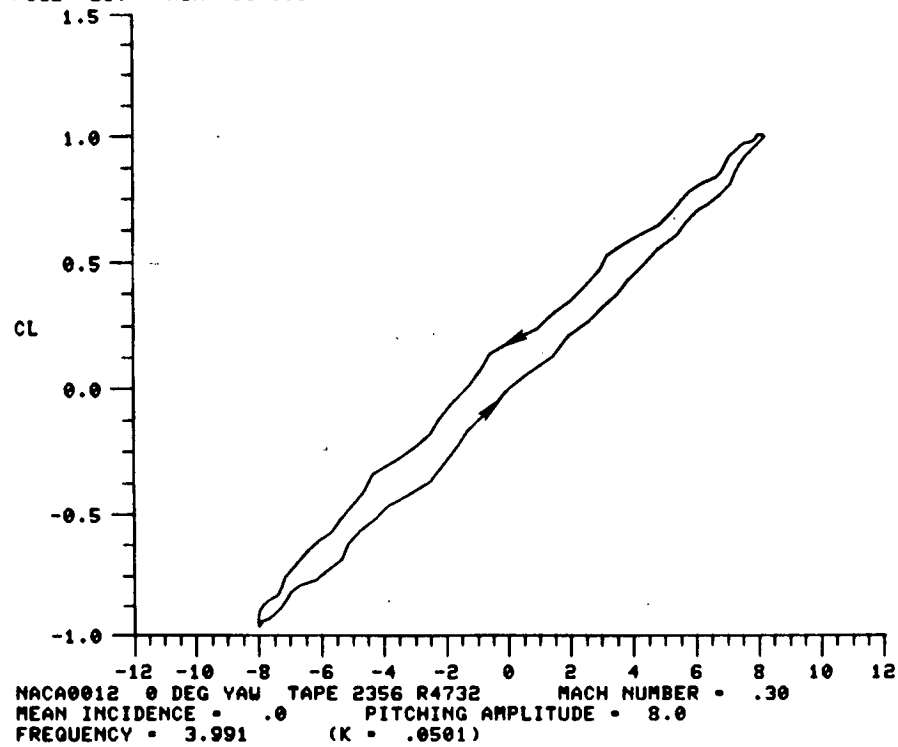


EFFECT OF SWEEP ON THE LIFT FORCE RESPONSE *

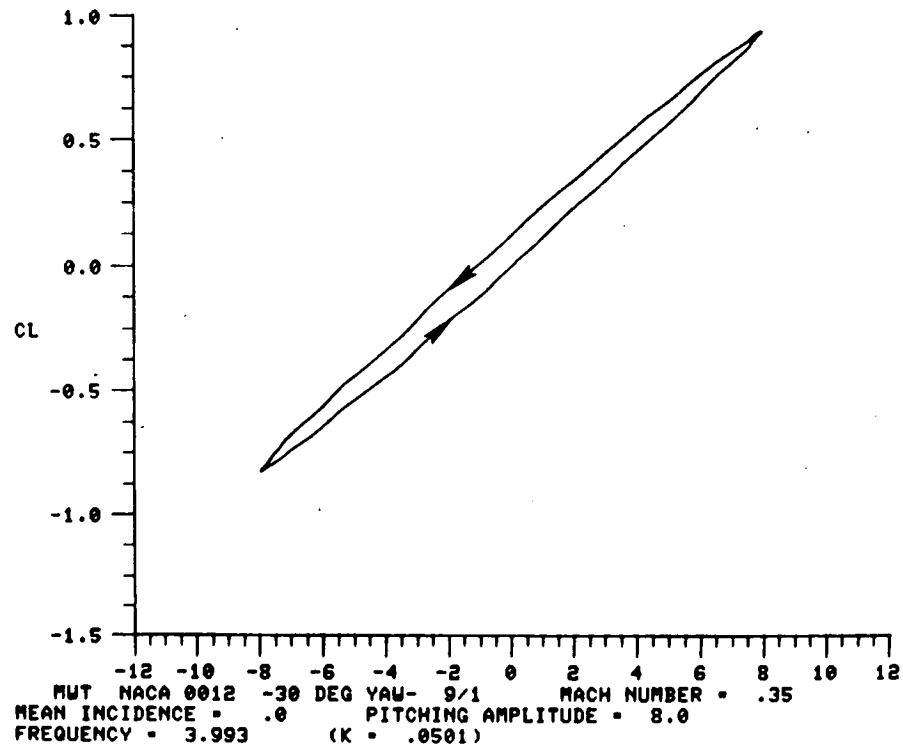
<u>Chordwise Mach Number</u>	<u>Mean Incidence Angle</u>	<u>Frequency</u>	<u>Reduced Frequency</u>	<u>Page</u> **
0.30 ↓	0	4.0	.050	108,109
	↓	8.0	.100	110,111
		10.0	.124	112,113
	9	4.0	.050	114,115
	↓	8.0	.100	116,117
		10.0	.124	118,119
	12	4.0	.050	120,121
	↓	8.0	.100	122,123
		10.0	.124	124,125
	15	4.0	.050	126,127
	↓	8.0	.100	128,129
		10.0	.124	130,131
0.40 ↓	0	4.0	.037	132,133
	↓	8.0	.075	134,135
		10.0	.093	136,137
	9	4.0	.037	138,139
	↓	8.0	.075	140,141
		10.0	.093	142,143
	12	4.0	.037	144,145
	↓	8.0	.075	146,147
		10.0	.093	148,149
	15	4.0	.037	150,151
	↓	8.0	.075	152,153
		10.0	.093	154,155

* The effect of sweep is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

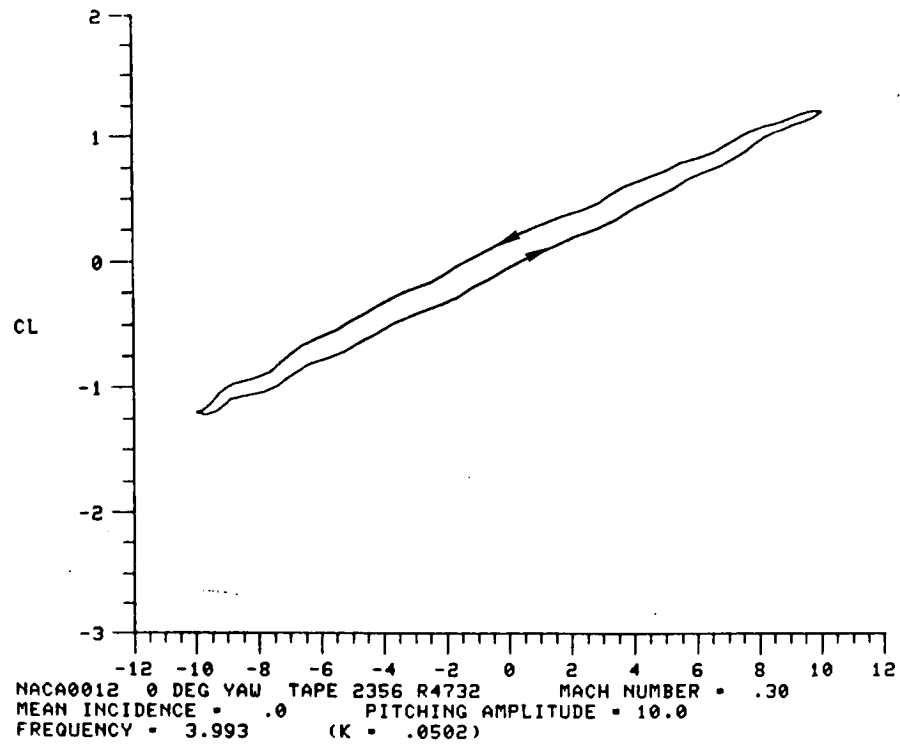
FILE 21. RUN 53.001



FILE 8. RUN1007.005

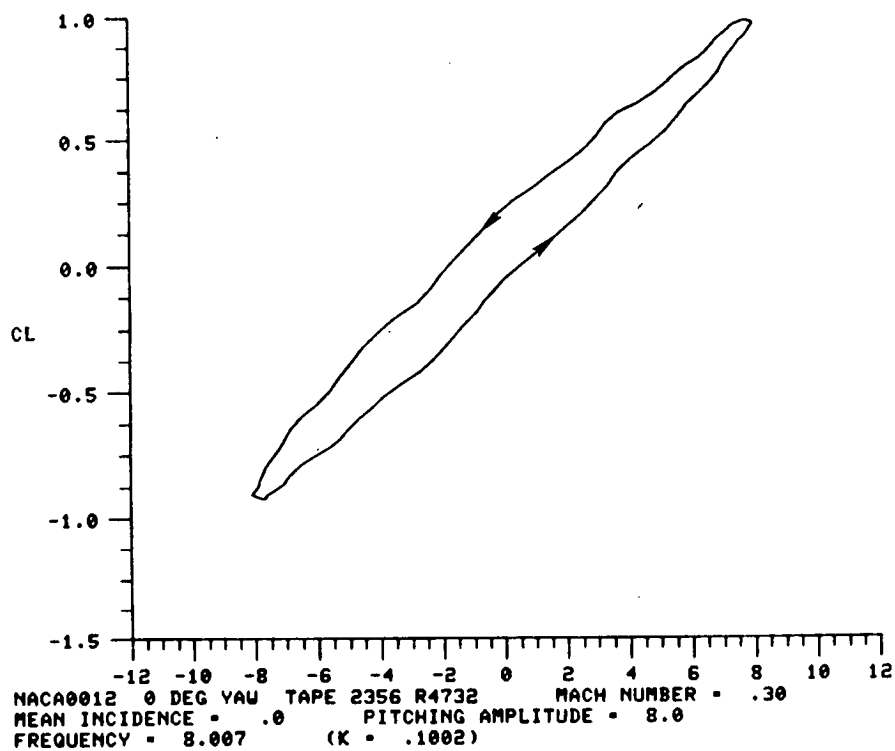


FILE 27. RUN 57.001

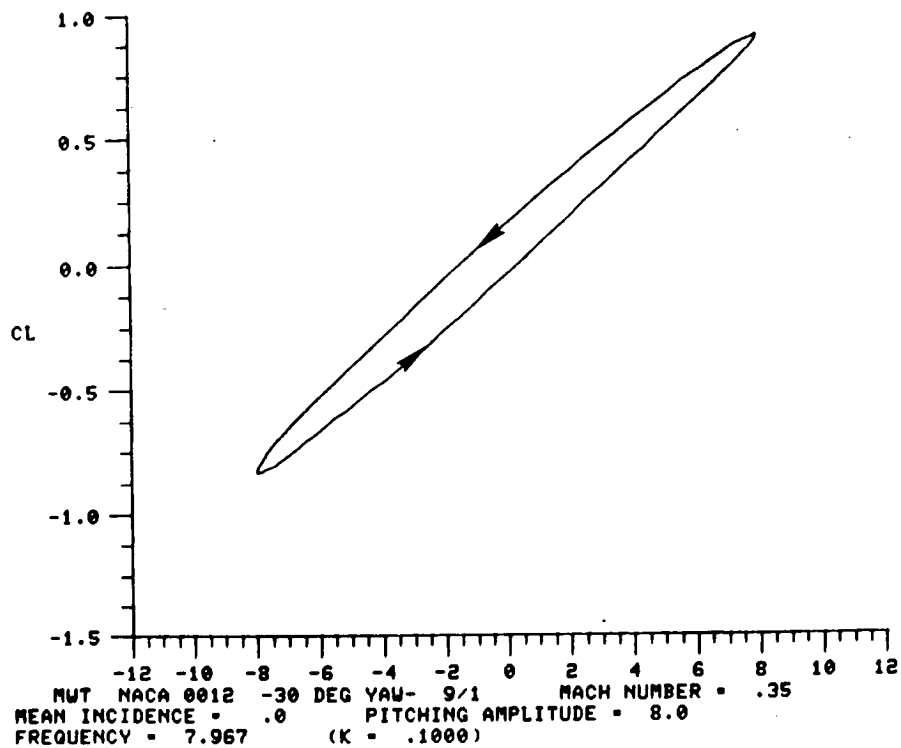


DATA WERE NOT OBTAINED

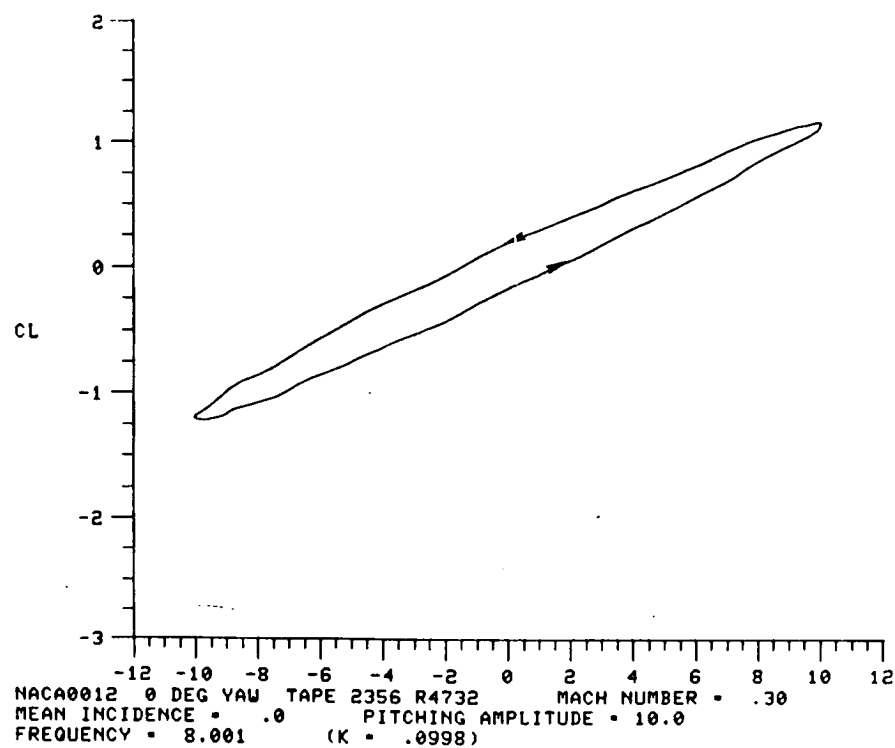
FILE 22. RUN 53.003



FILE 10. RUN1007.009

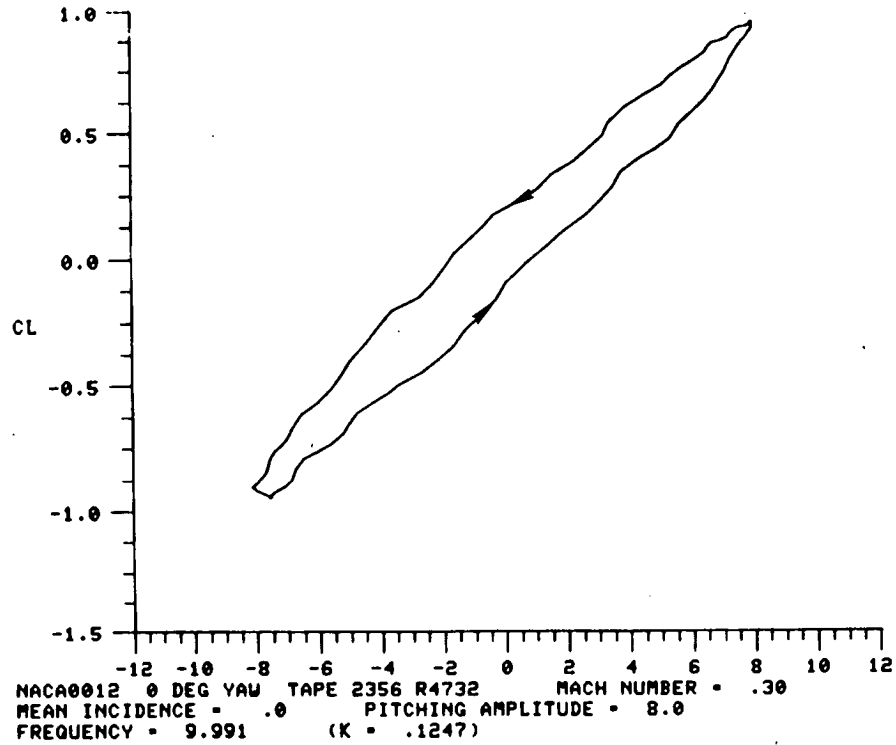


FILE 28. RUN 57.003

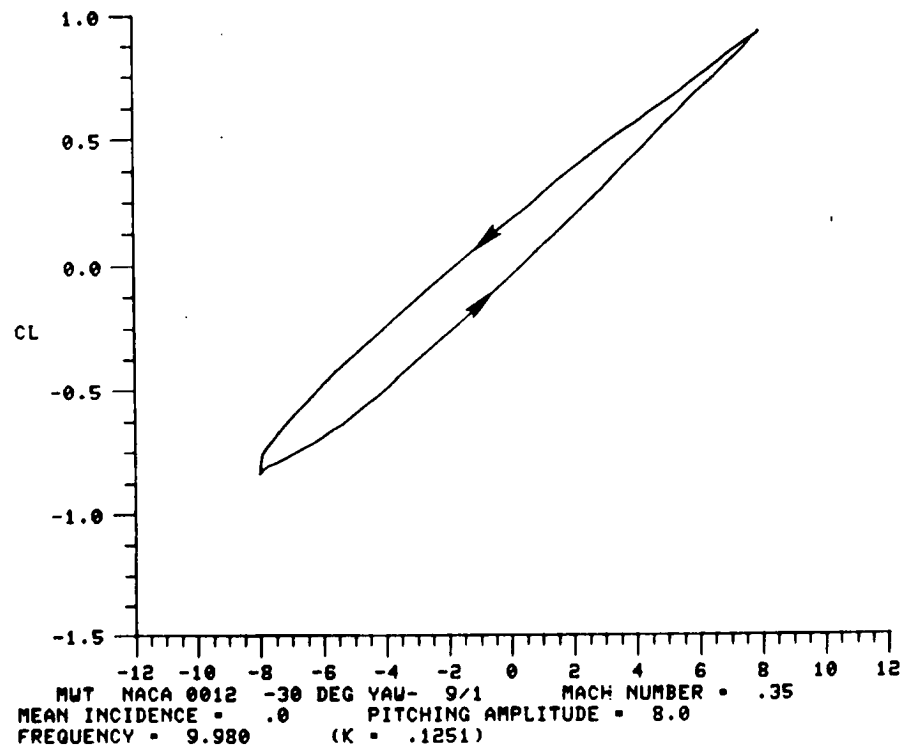


DATA WERE NOT OBTAINED

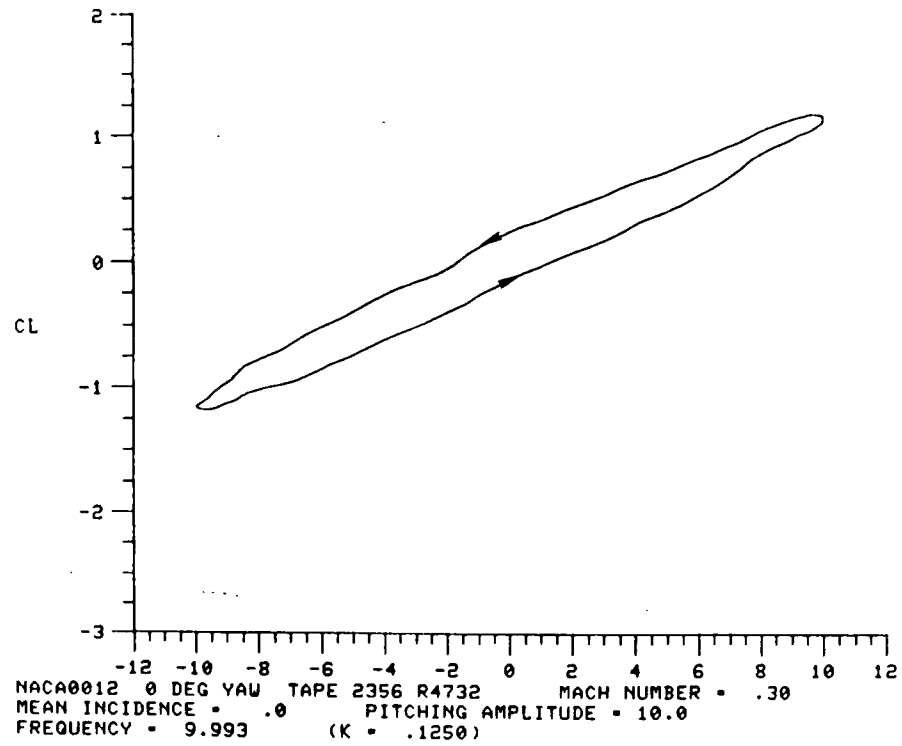
FILE 23. RUN 53.005



FILE 11. RUN1007.011

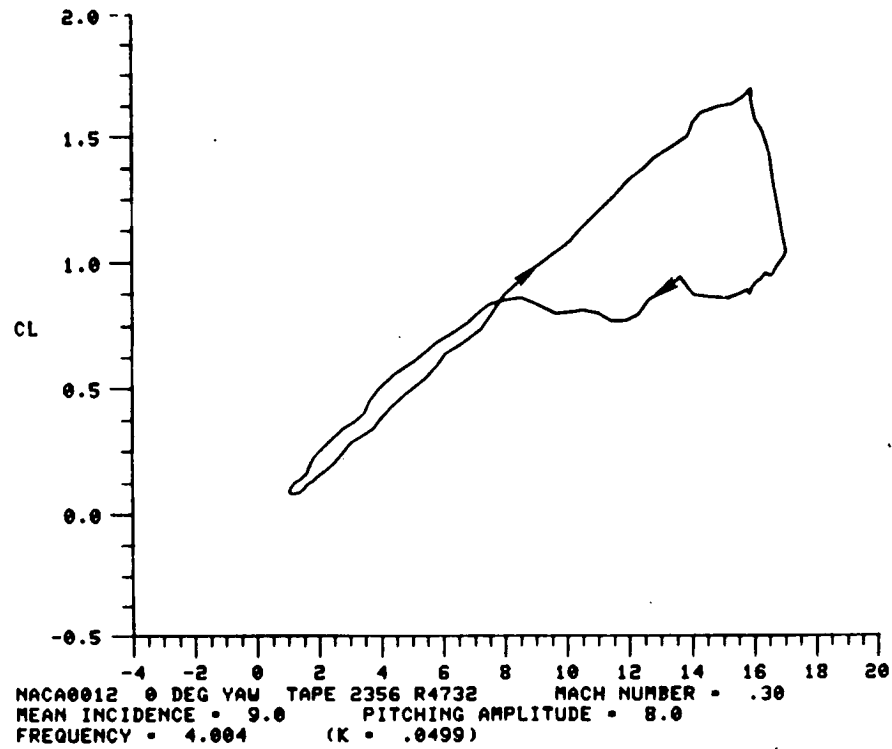


FILE 29. RUN 57.005

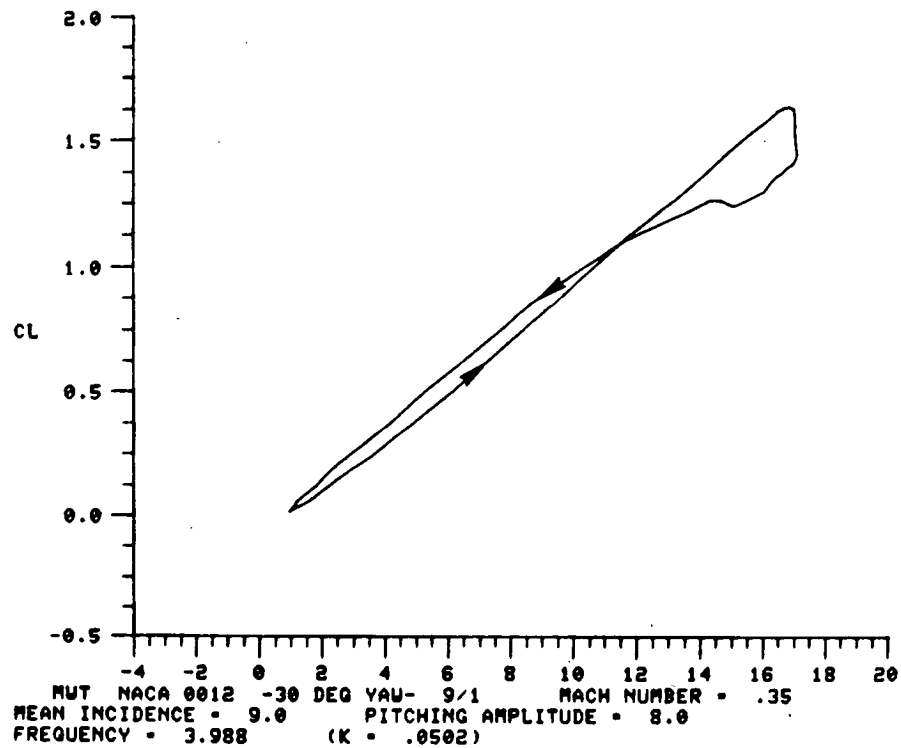


DATA WERE NOT OBTAINED

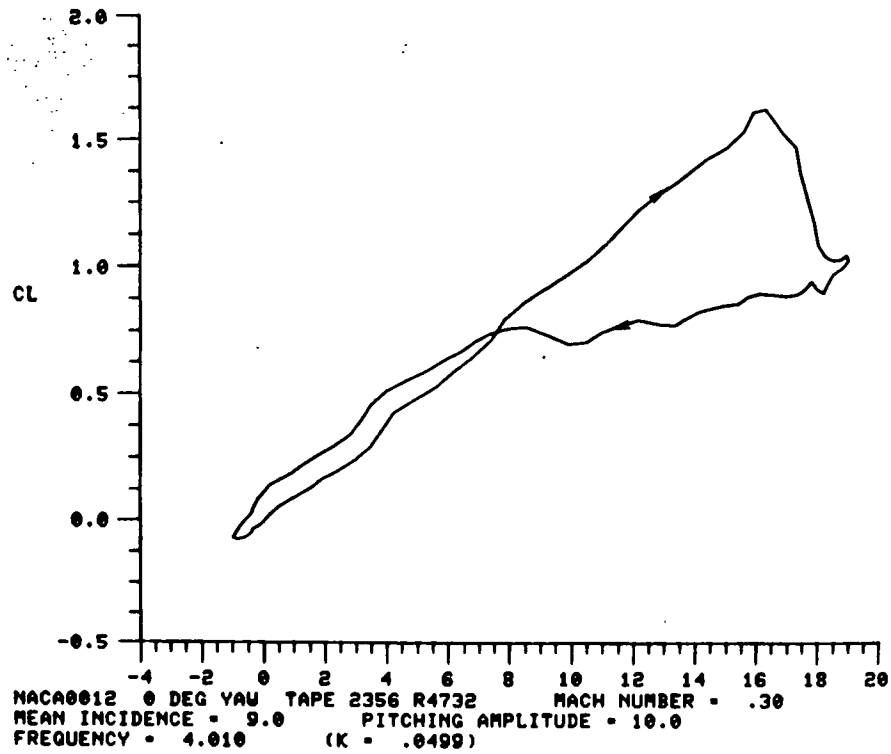
FILE 3. RUN 47.001



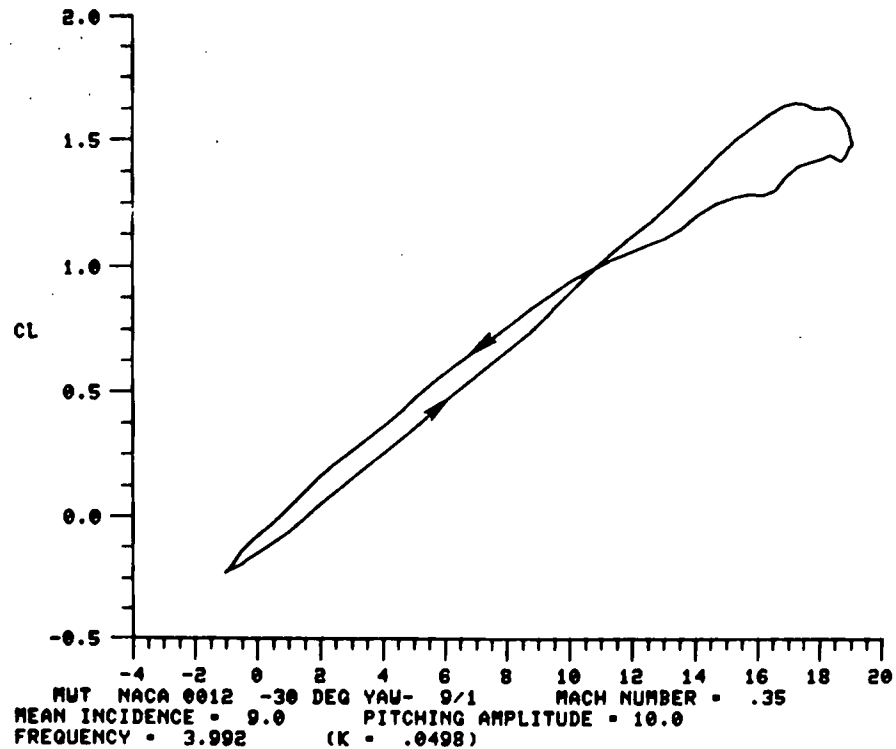
FILE 26. RUN1018.013



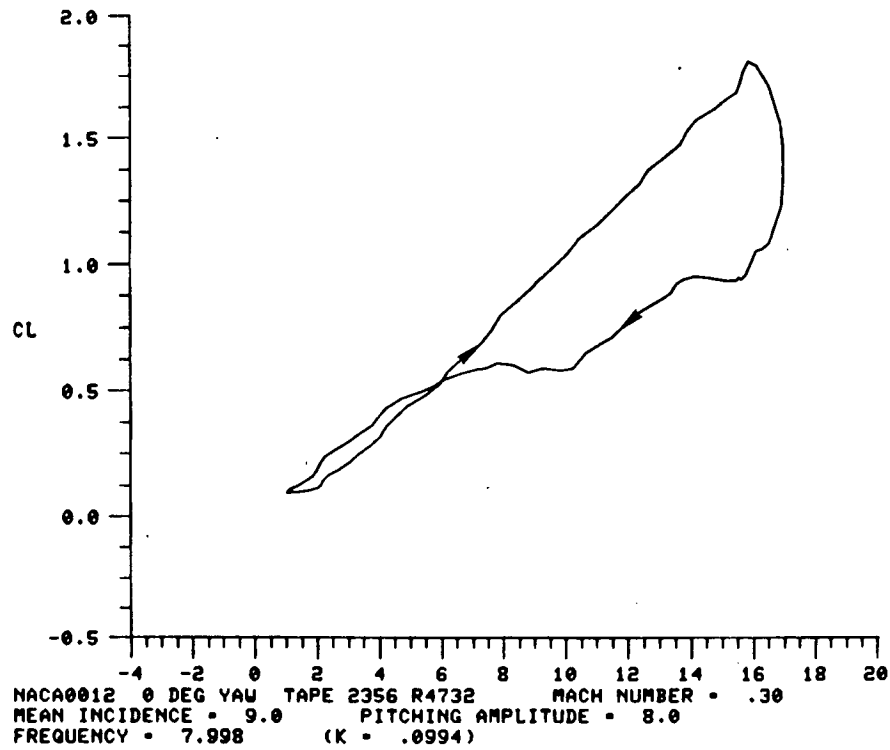
FILE 39. RUN 61.001



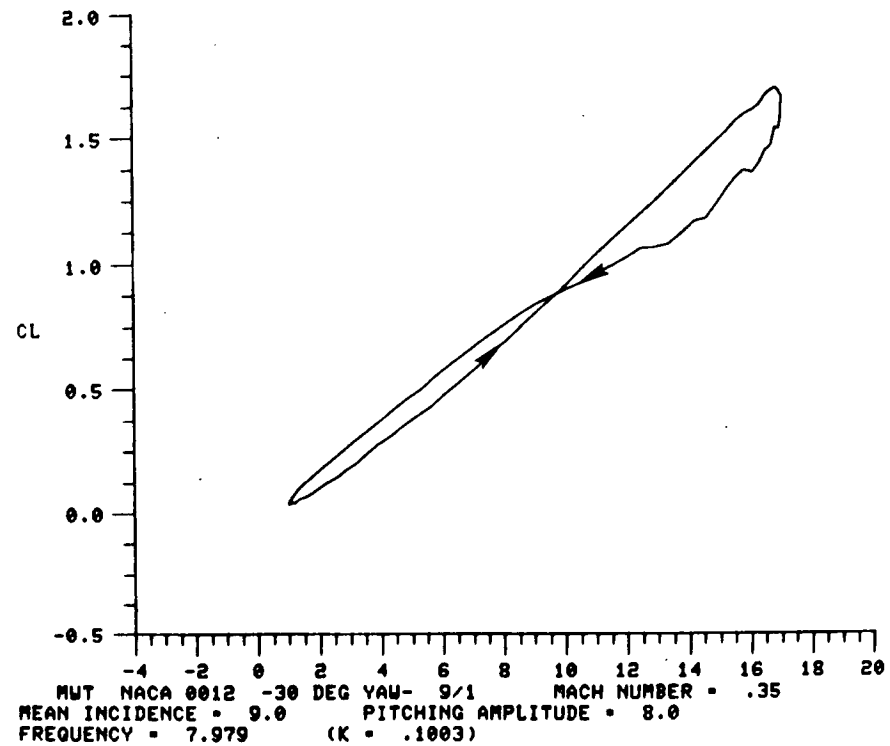
FILE 6. RUN1029.008



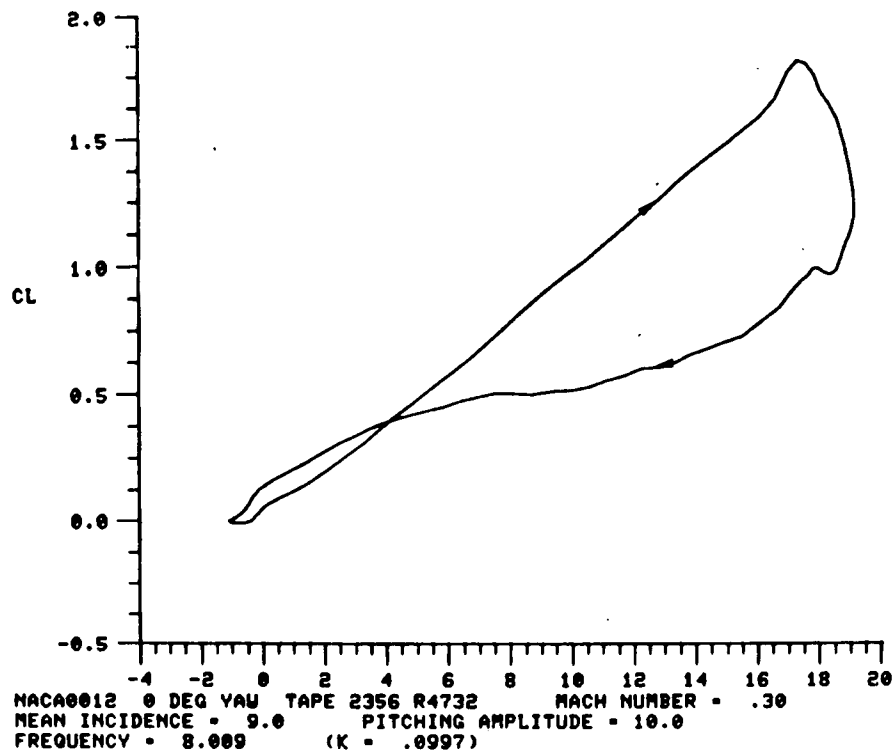
FILE 4. RUN 47.003



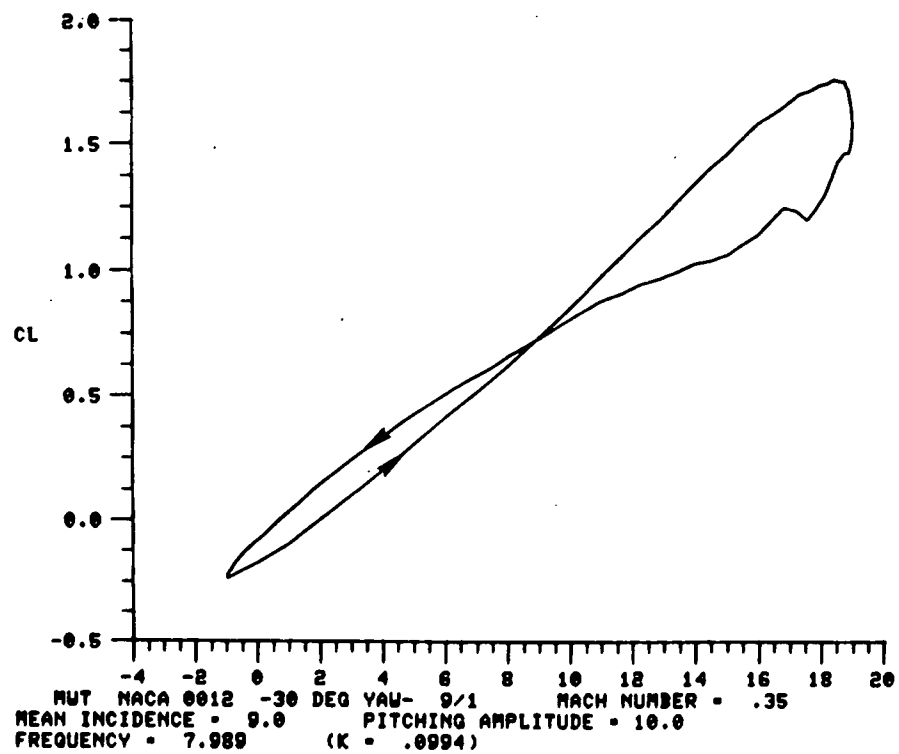
FILE 28. RUN1018.017



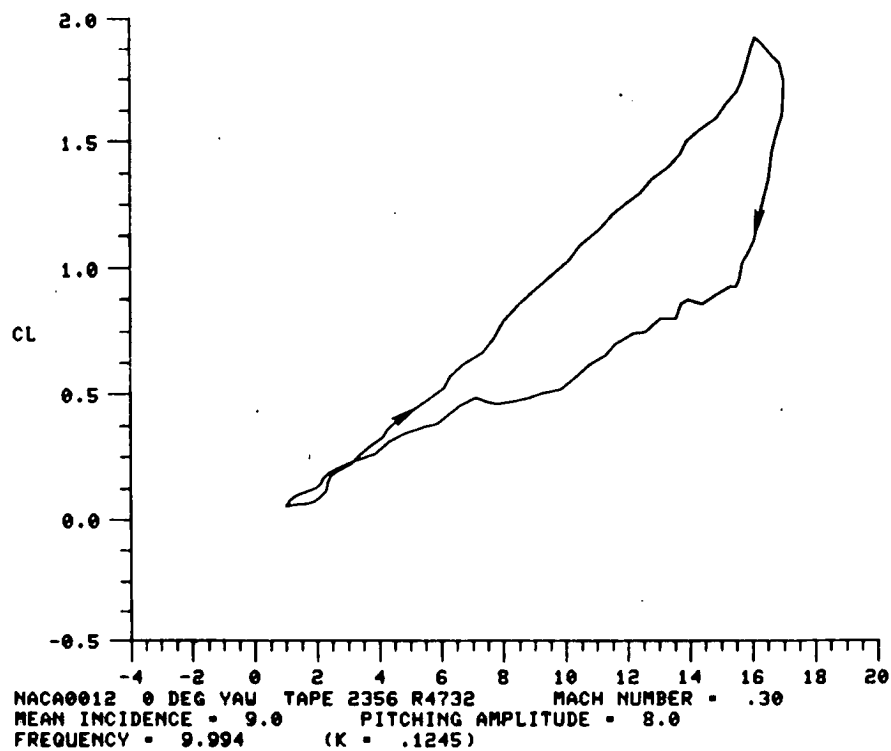
FILE 40. RUN 61.004



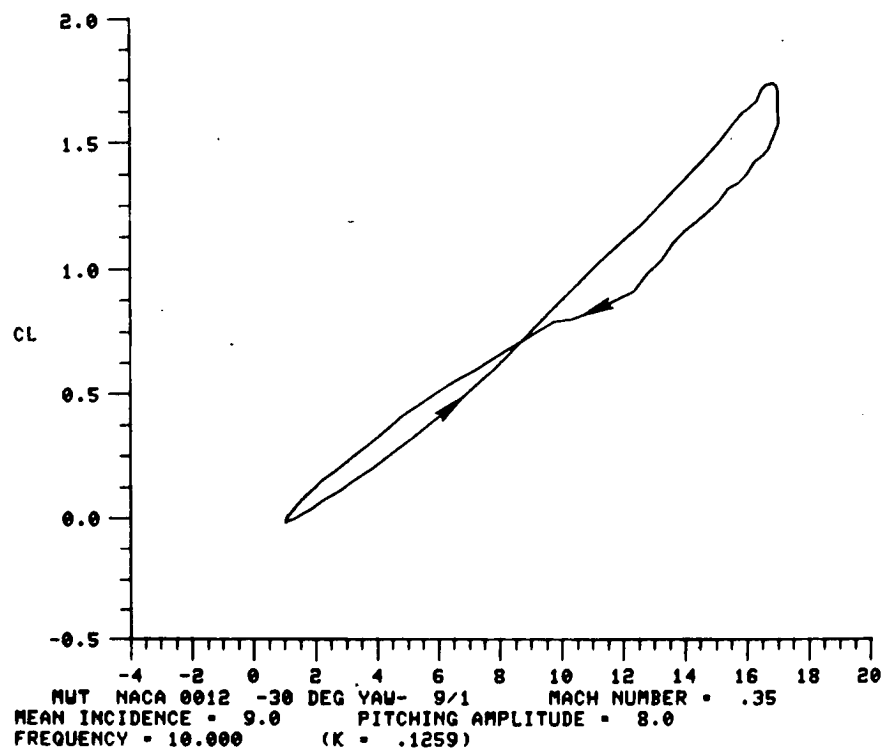
FILE 8. RUN1029.012



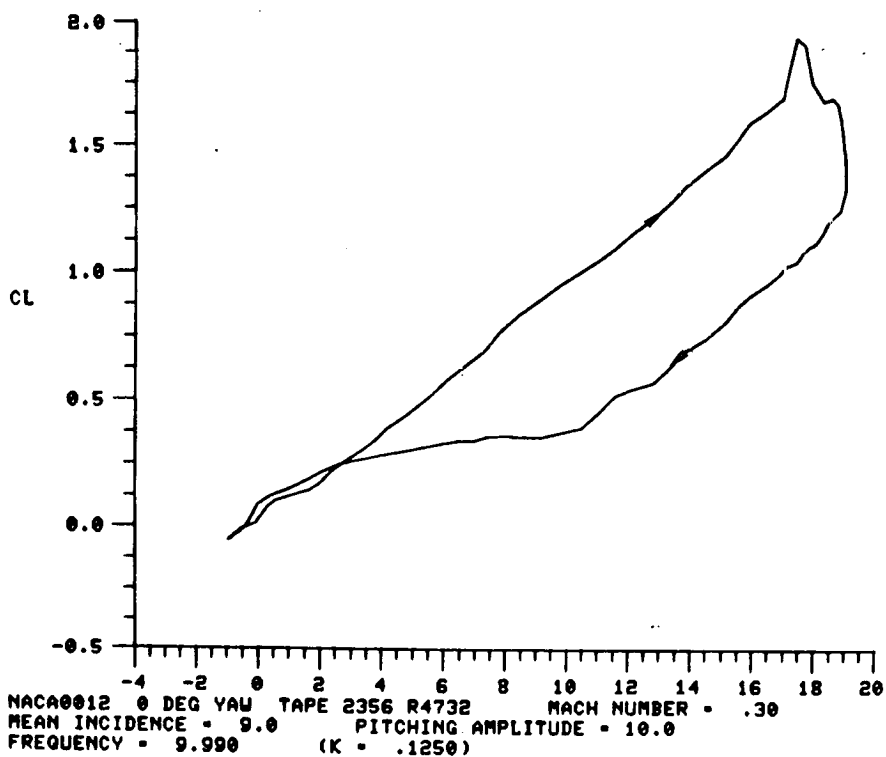
FILE 5. RUN 47.005



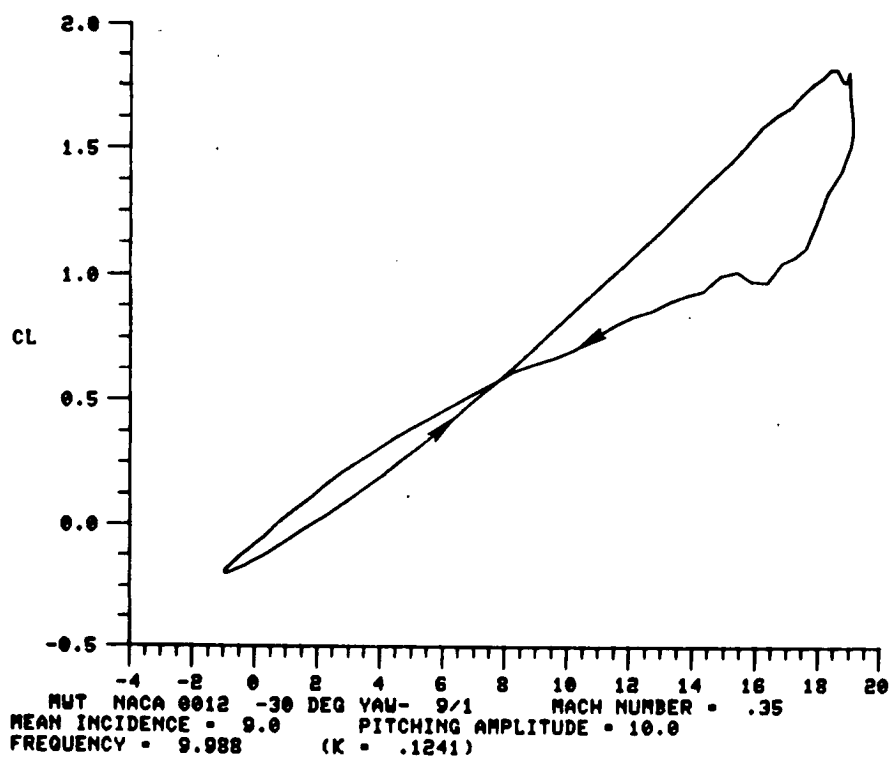
FILE 29. RUN1018.019



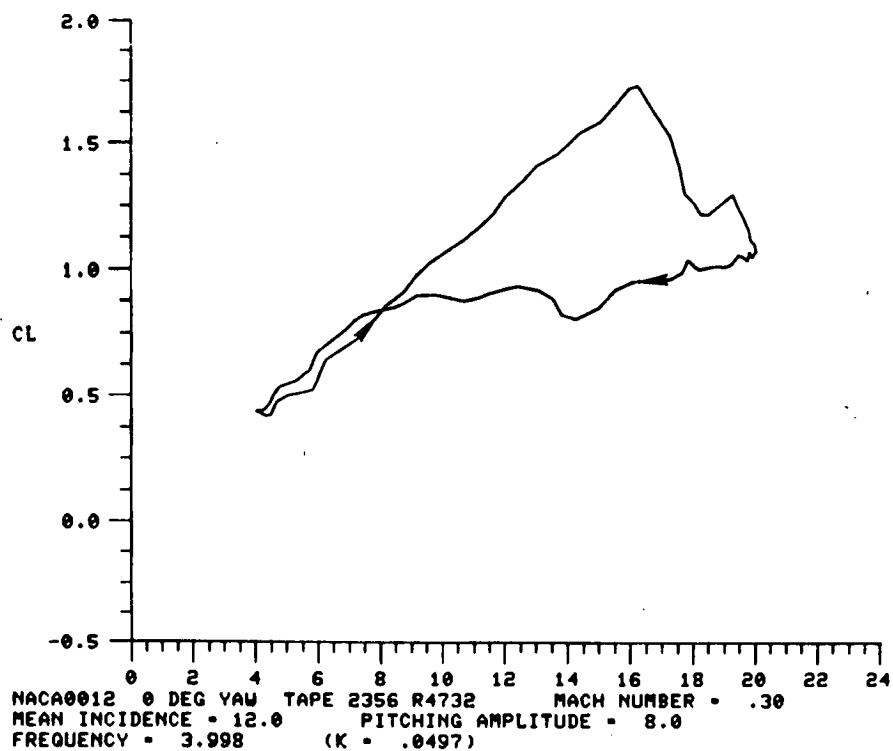
FILE 41. RUN 61.006



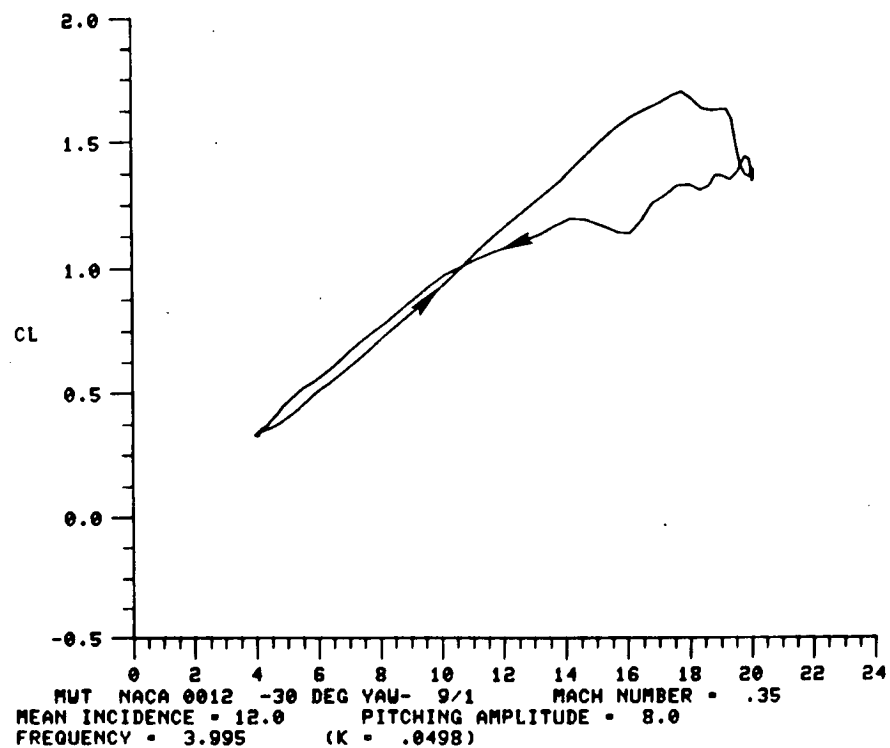
FILE 9. RUN1029.014



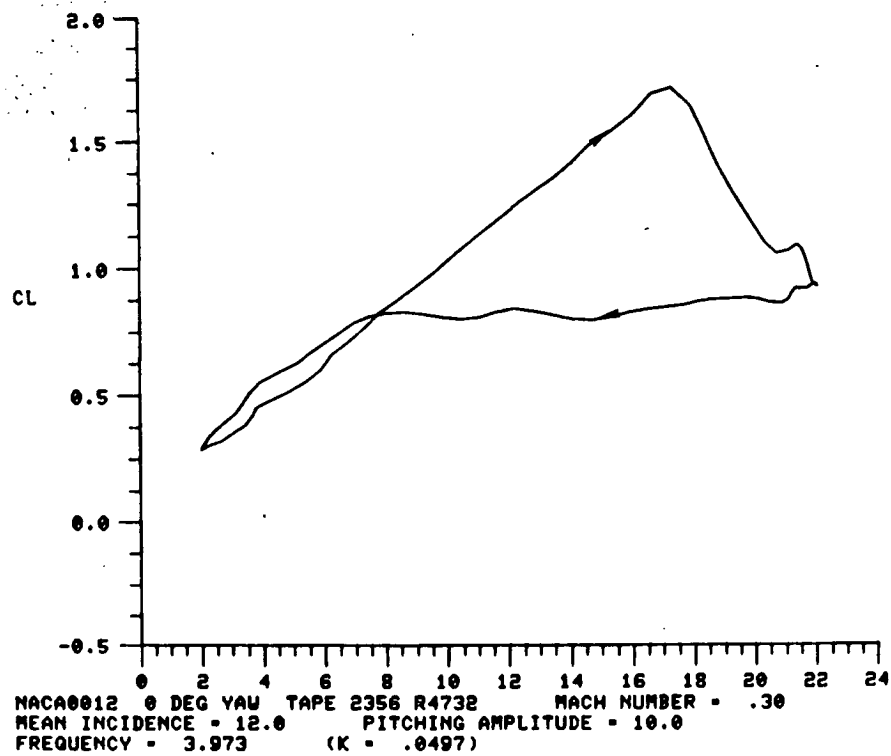
FILE 15. RUN 51.001



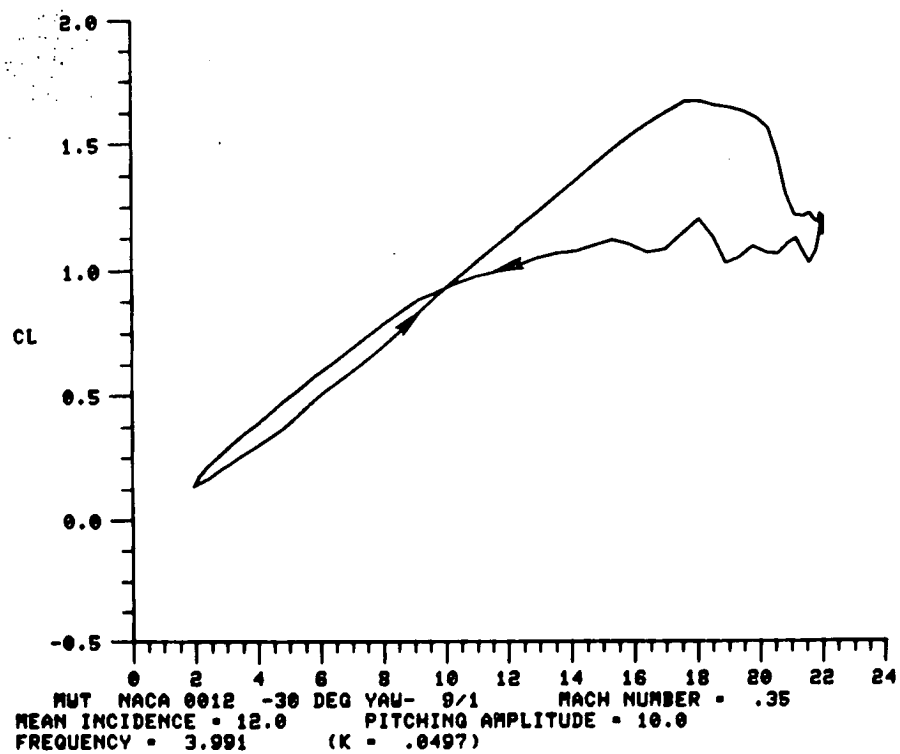
FILE 53. RUN1016.004



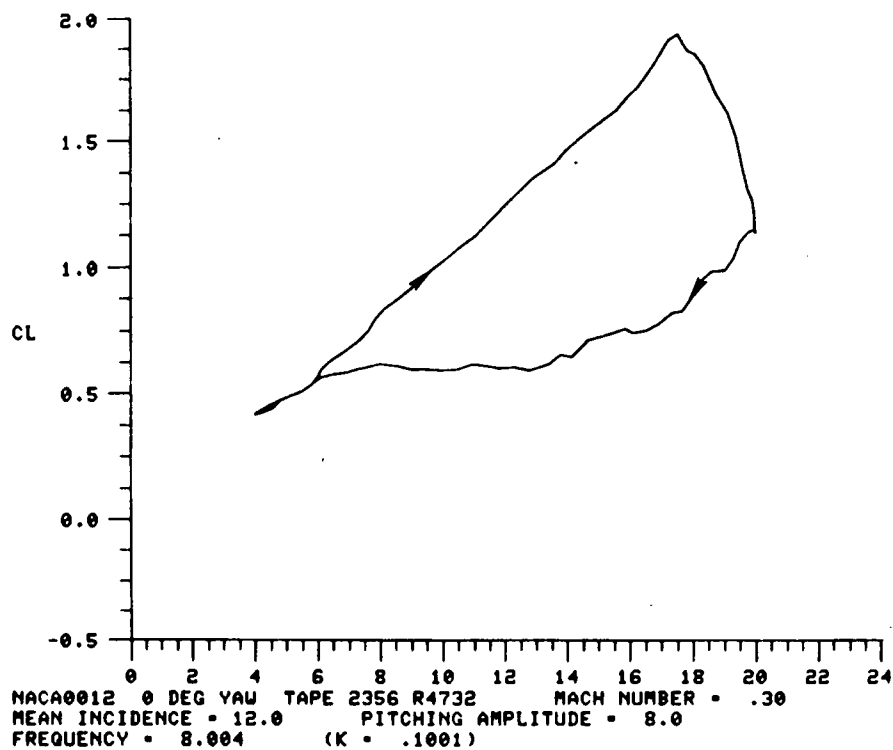
FILE 33. RUN 59.001



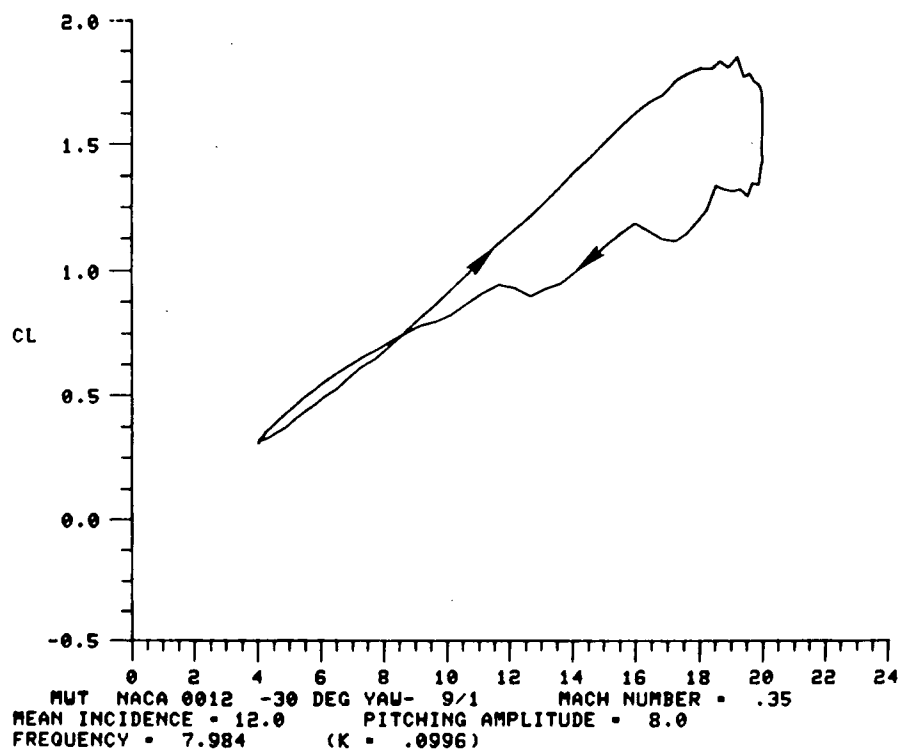
FILE 39. RUN1033.008



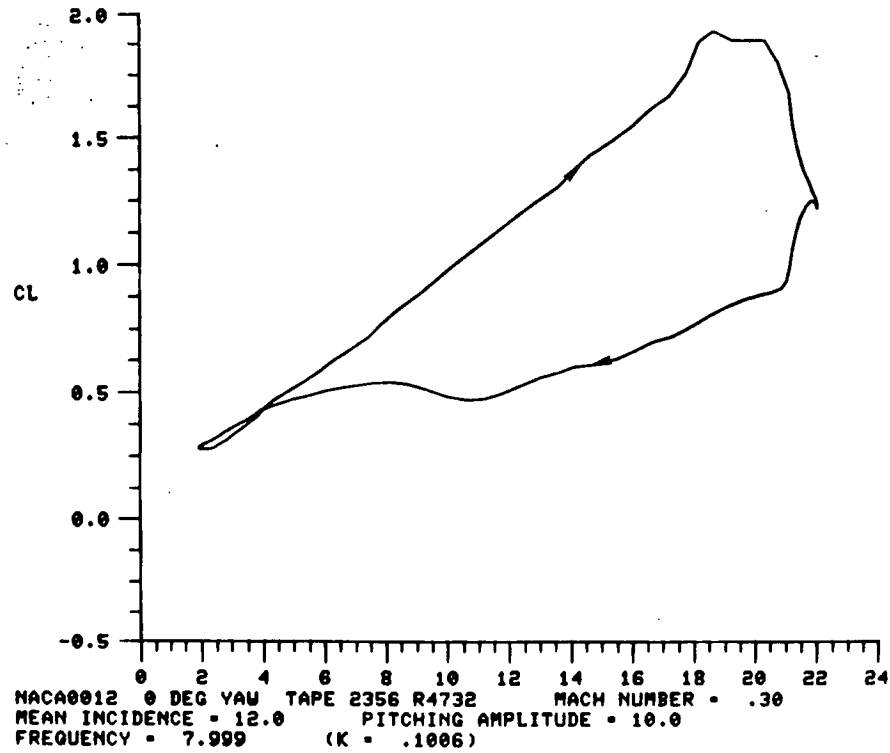
FILE 16. RUN 51.003



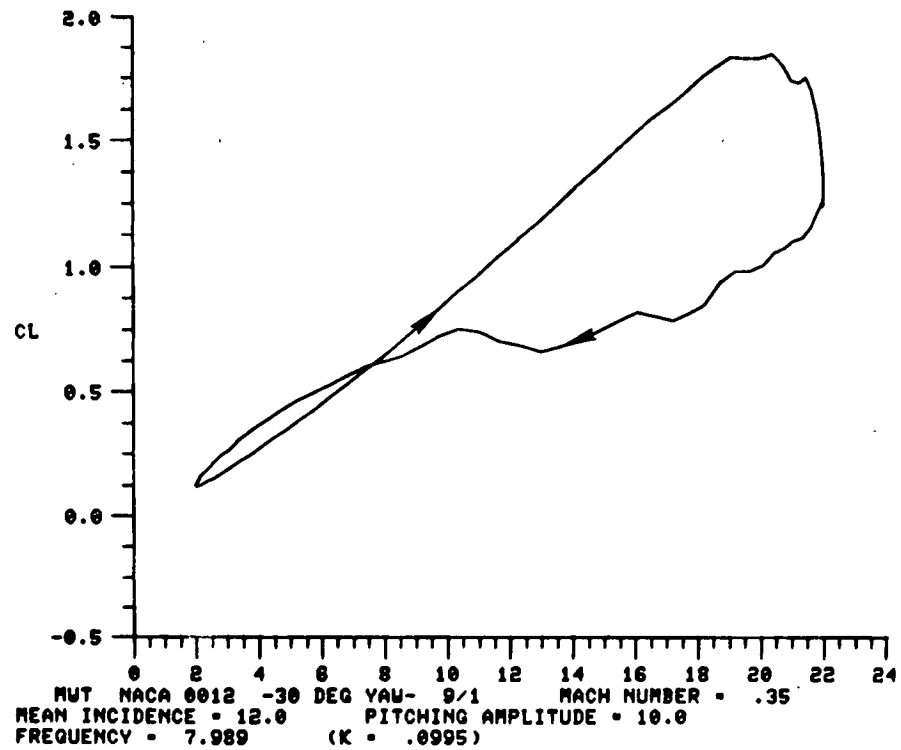
FILE 19. RUN1016.010



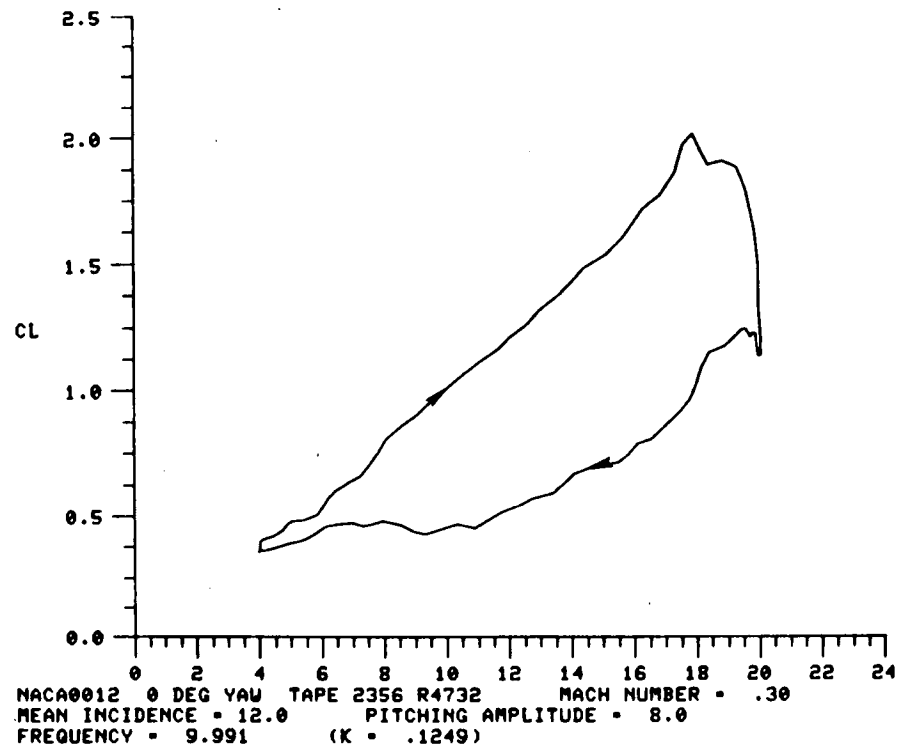
FILE 34. RUN 59.004



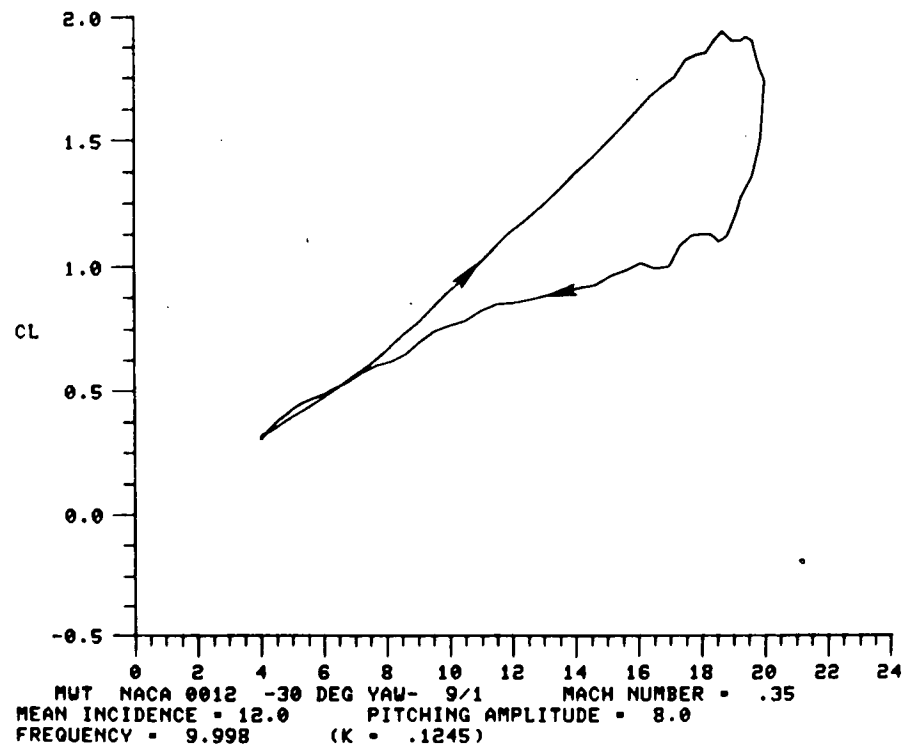
FILE 41. RUN1033.018



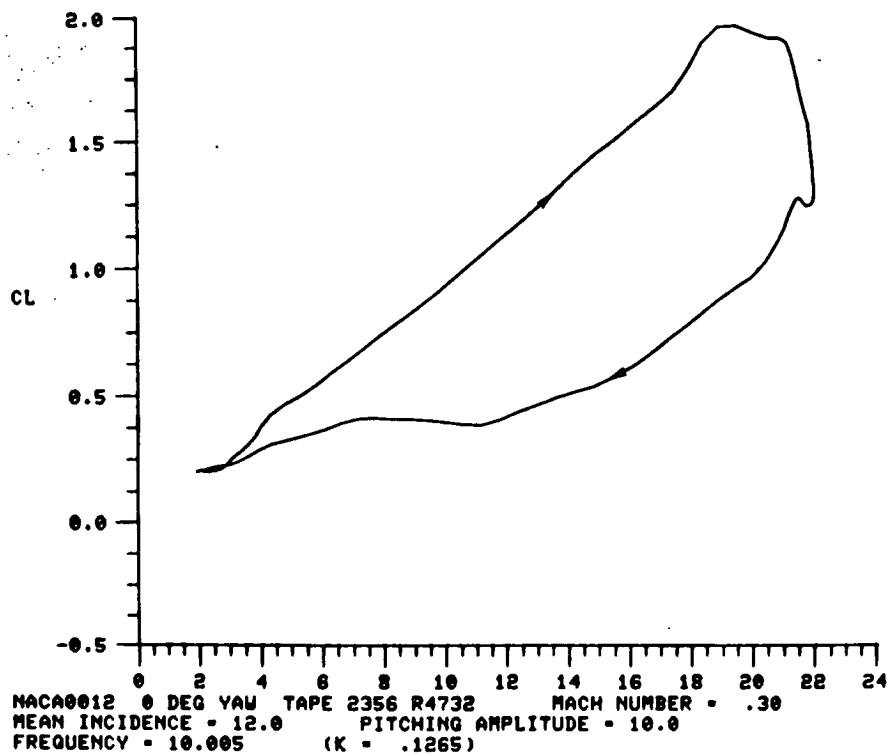
FILE 17. RUN 51.005



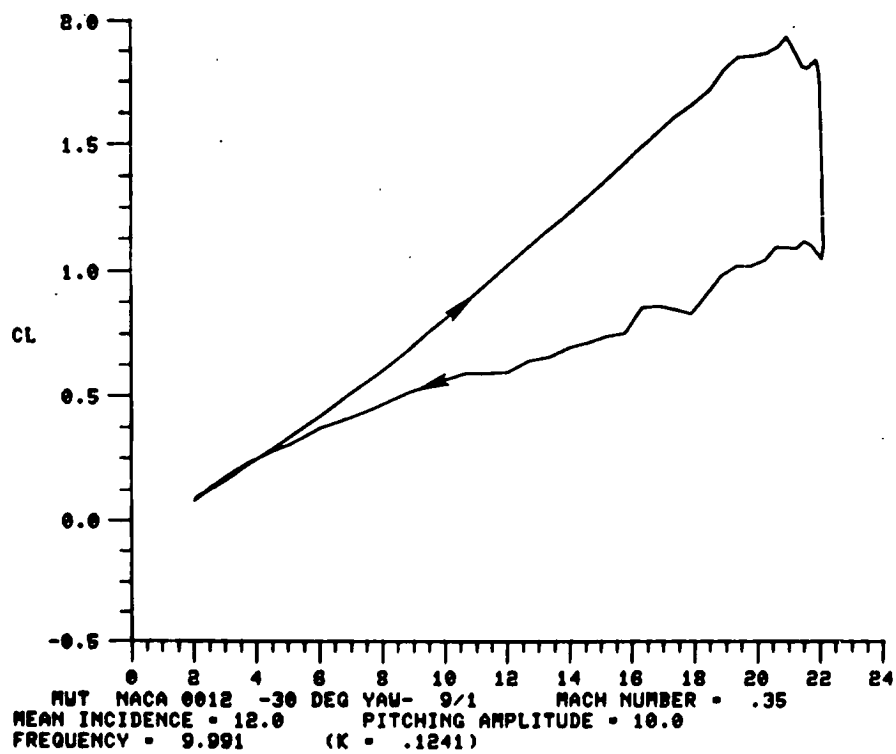
FILE 20. RUN3016.012



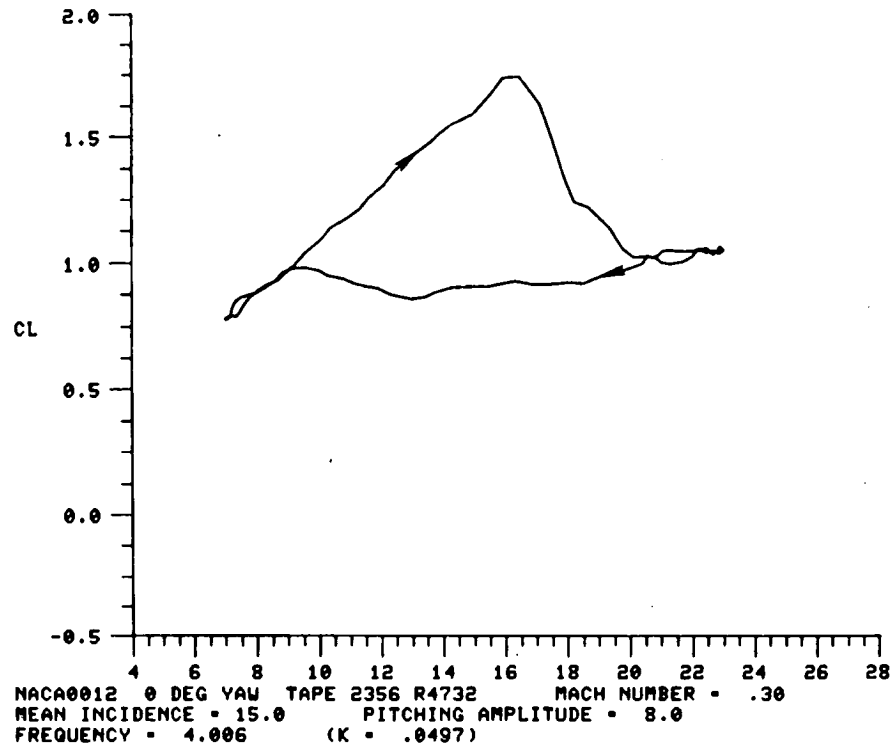
FILE 35. RUN 59.007



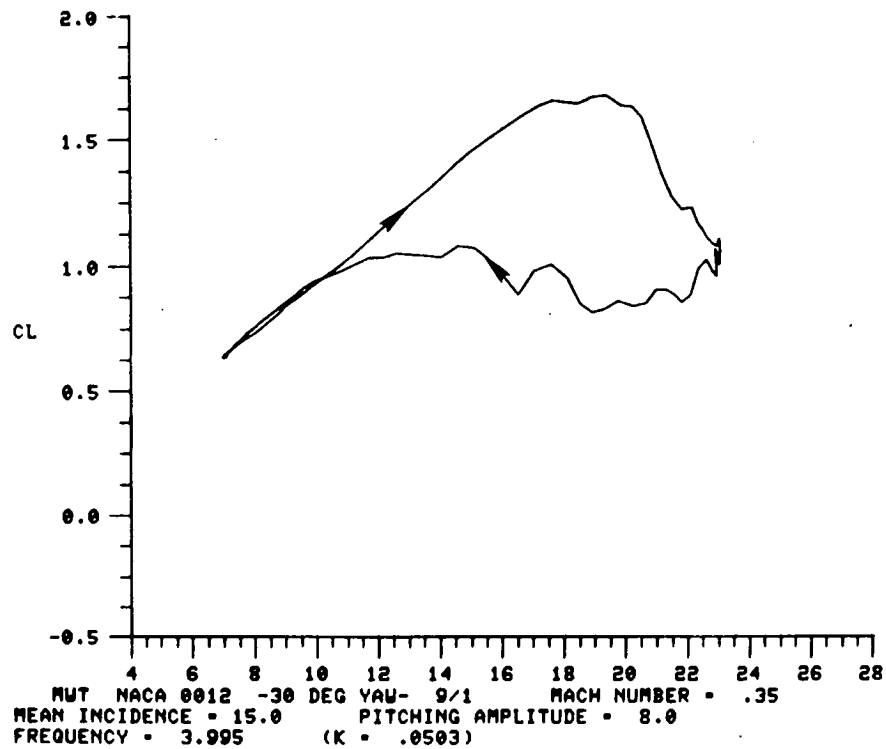
FILE 48. RUN1033.014



FILE 9. RUN 49.001

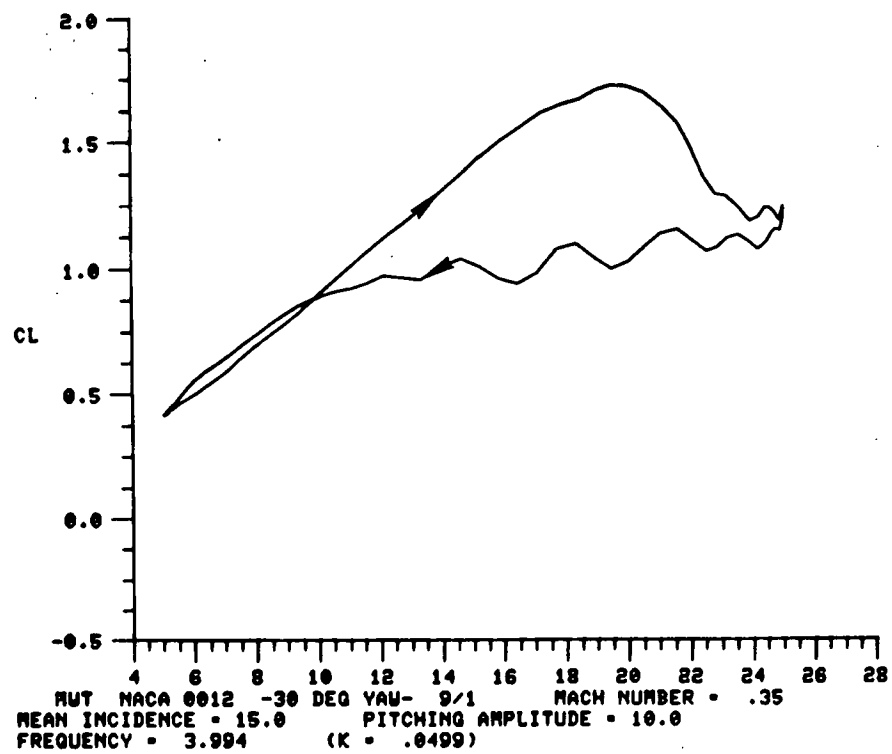


FILE 35. RUN1020.008

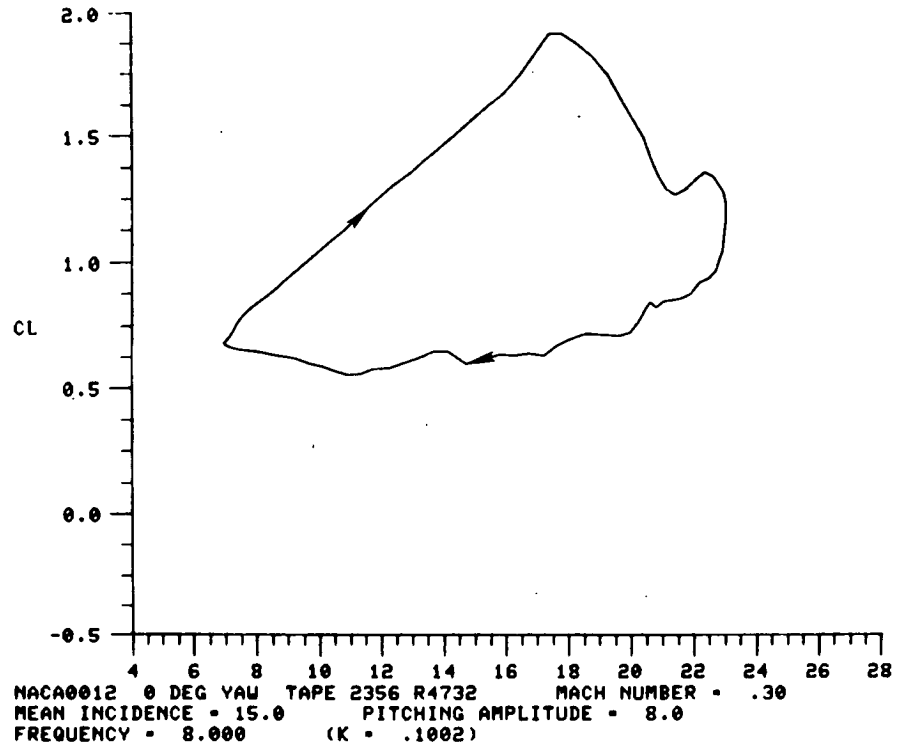


DATA WERE NOT OBTAINED

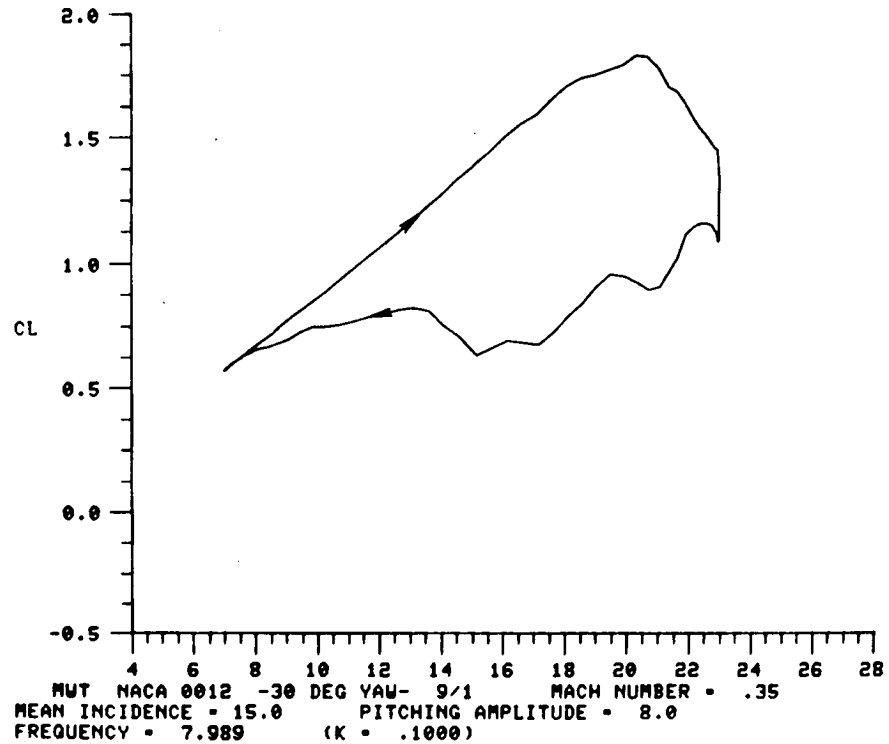
FILE 53. RUN1036.001



FILE 10. RUN 49.003

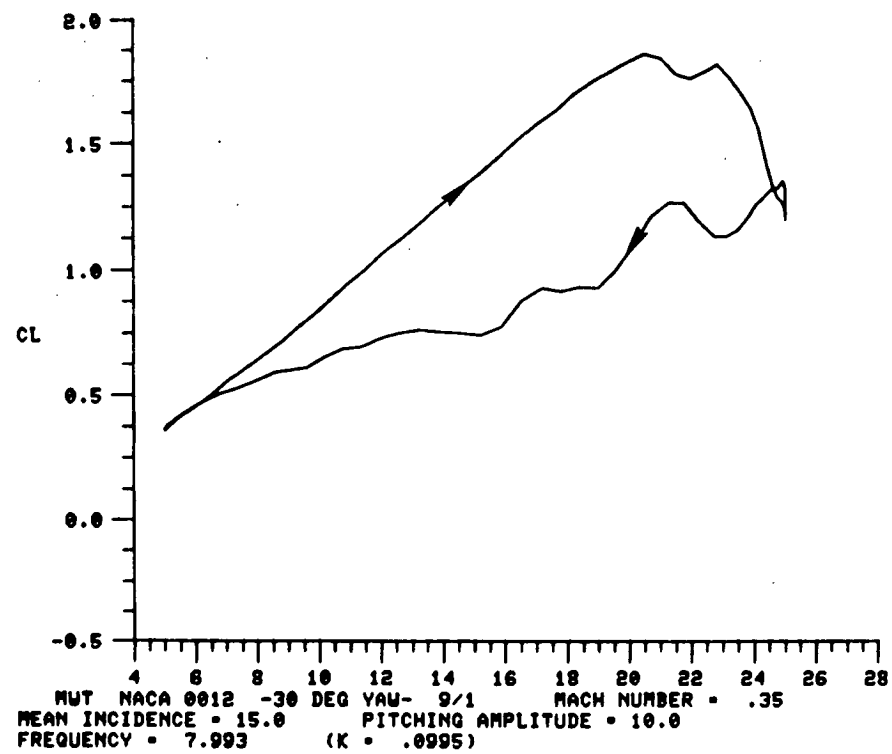


FILE 37. RUN1020.012

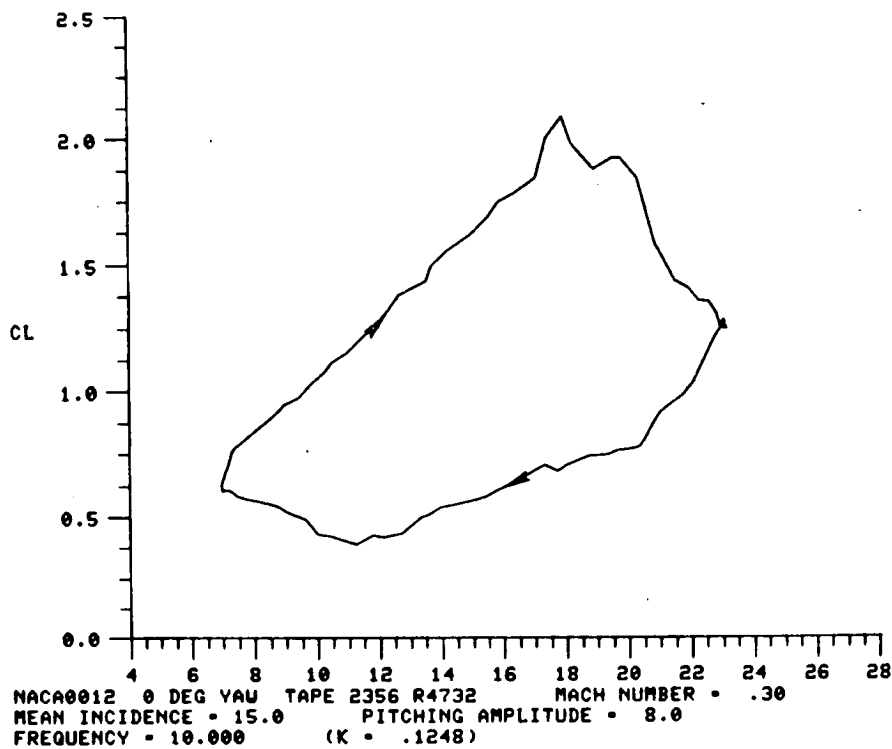


DATA WERE NOT OBTAINED

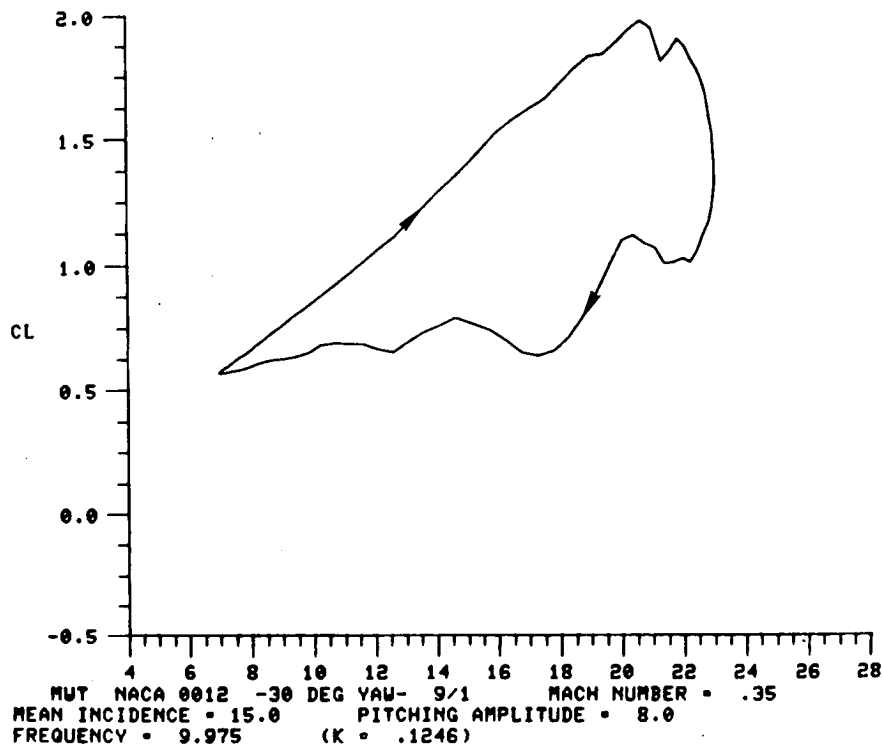
FILE 55. RUN1036.005



FILE 11. RUN 49.005

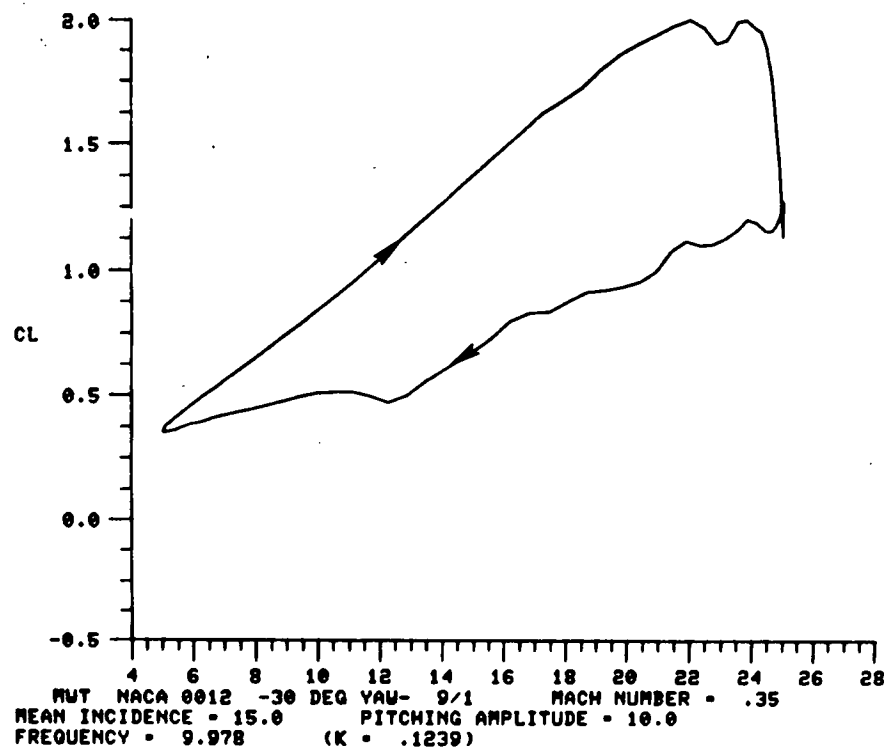


FILE 38. RUN1020.014

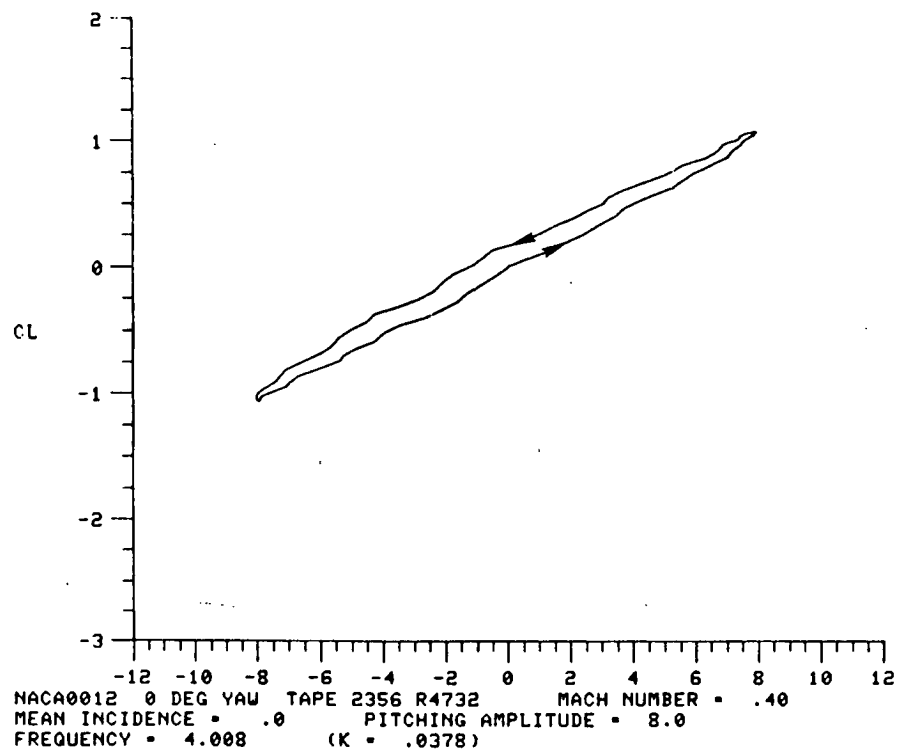


DATA WERE NOT OBTAINED

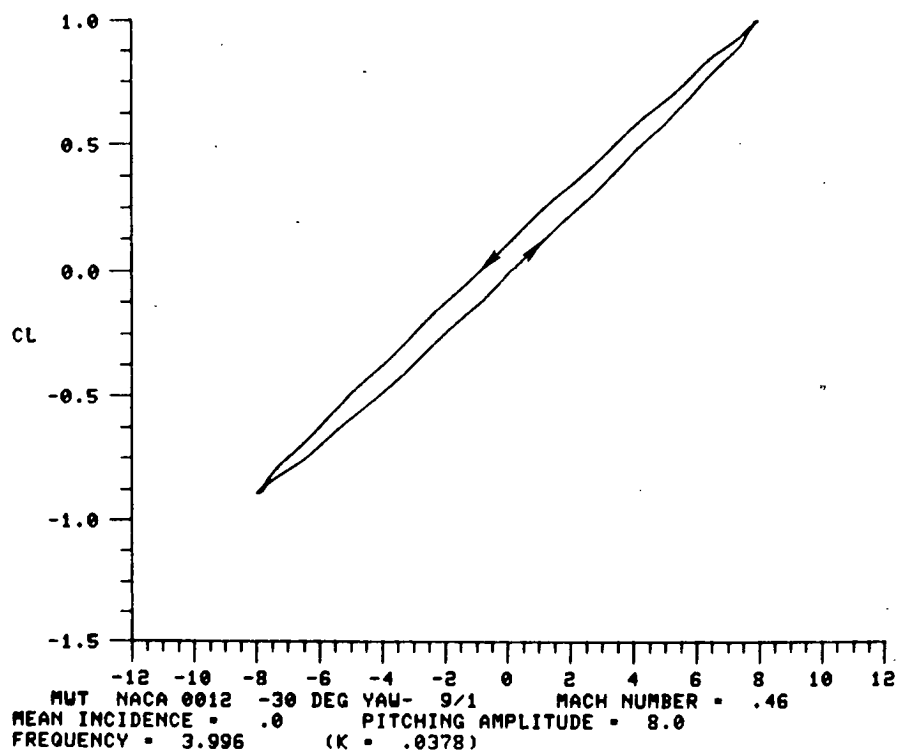
FILE 56. RUN1036.007



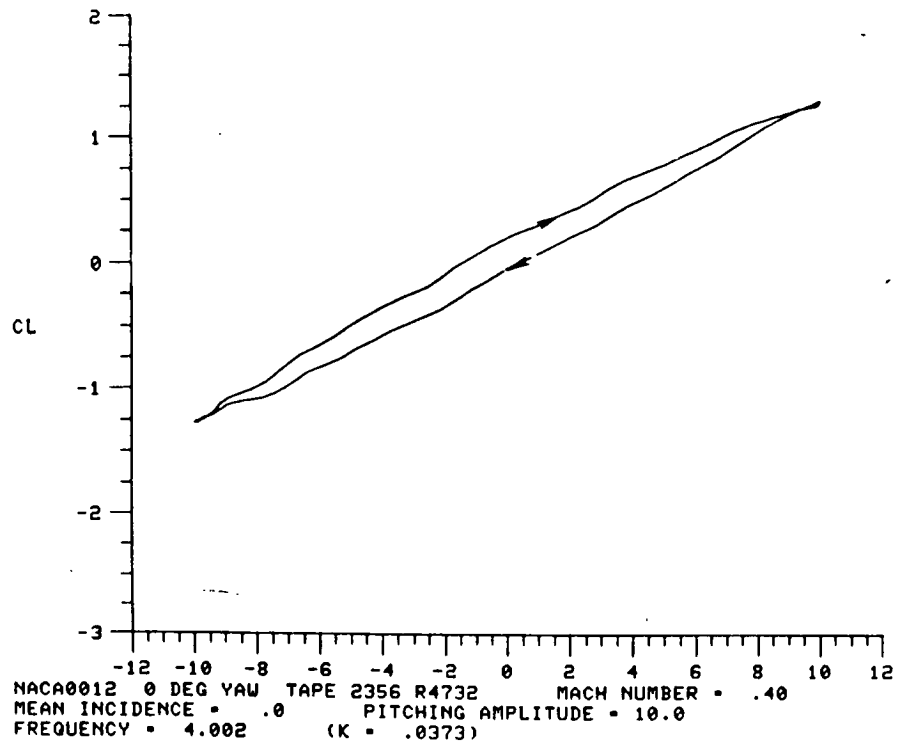
FILE 24. RUN 54.001



FILE 12. RUN1008.001

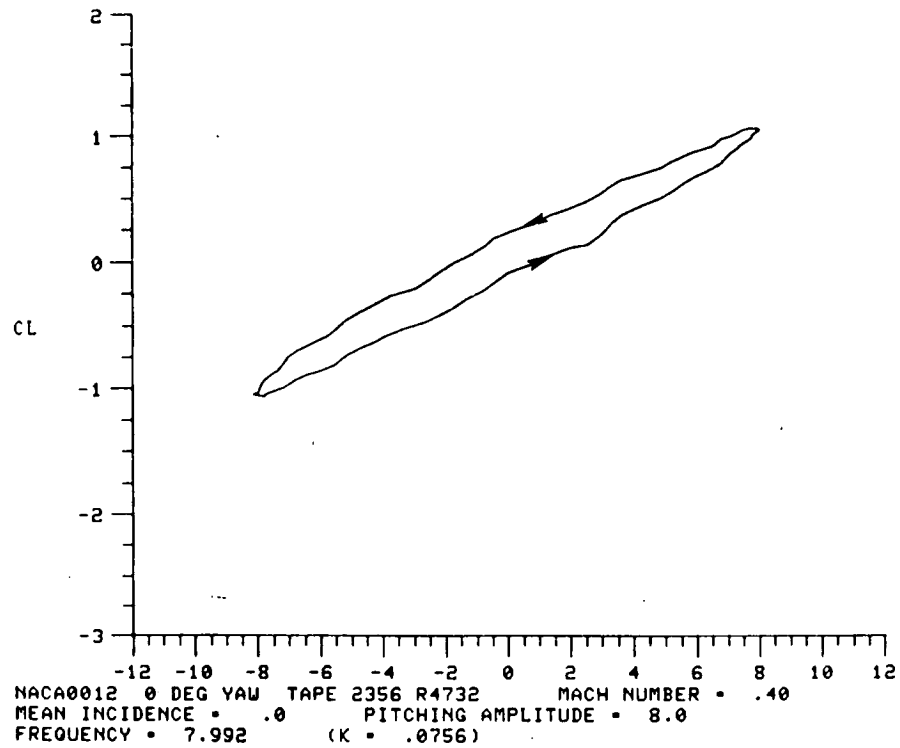


FILE 30. RUN 58.001

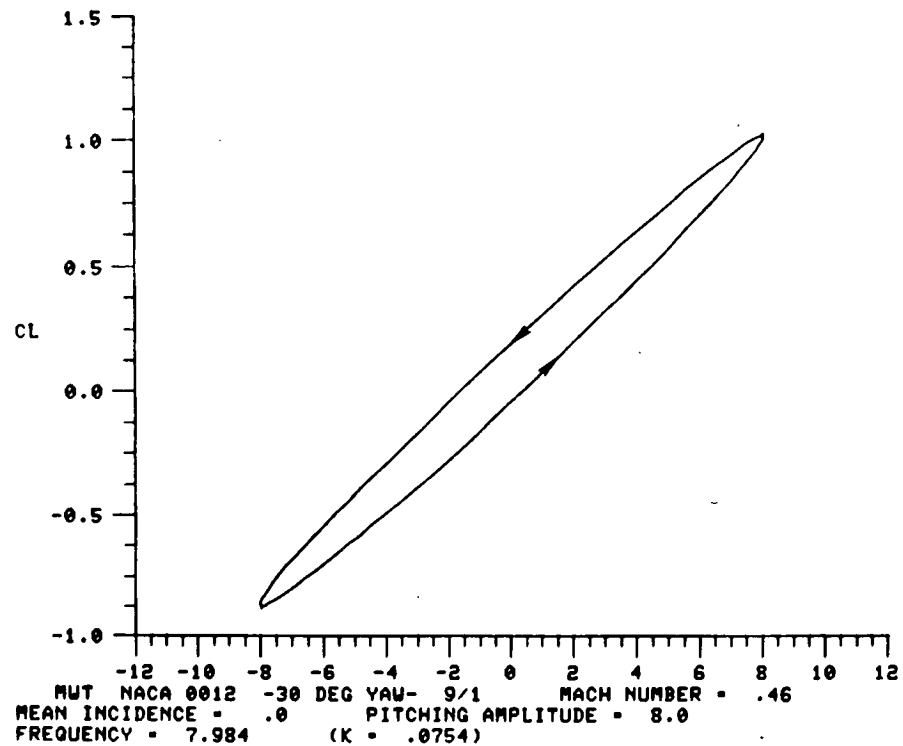


DATA WERE NOT OBTAINED

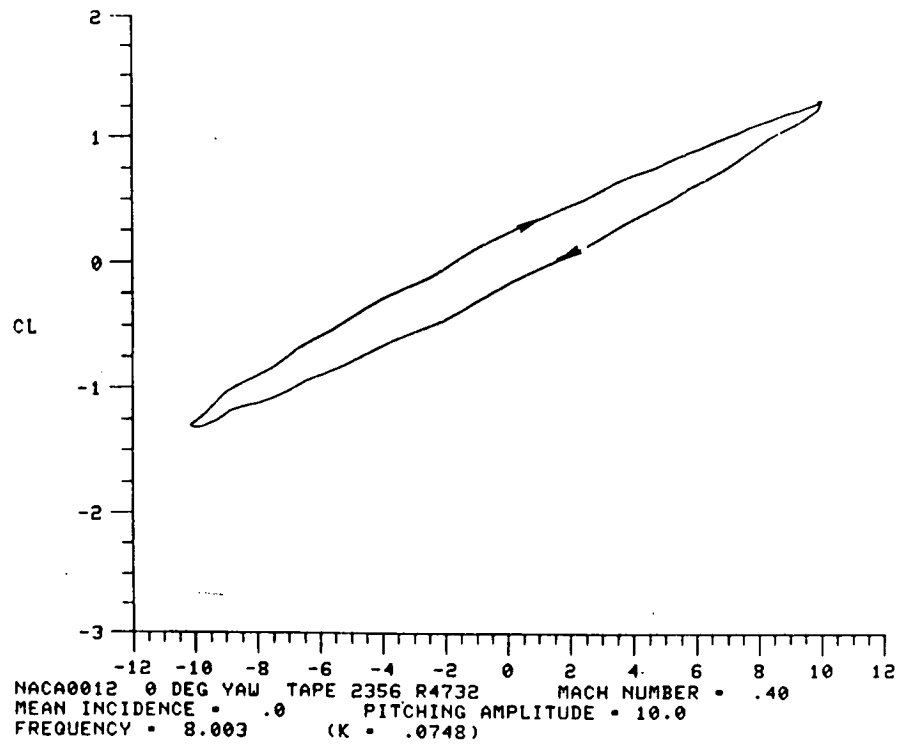
FILE 25. RUN 54.003



FILE 14. RUN1008.005

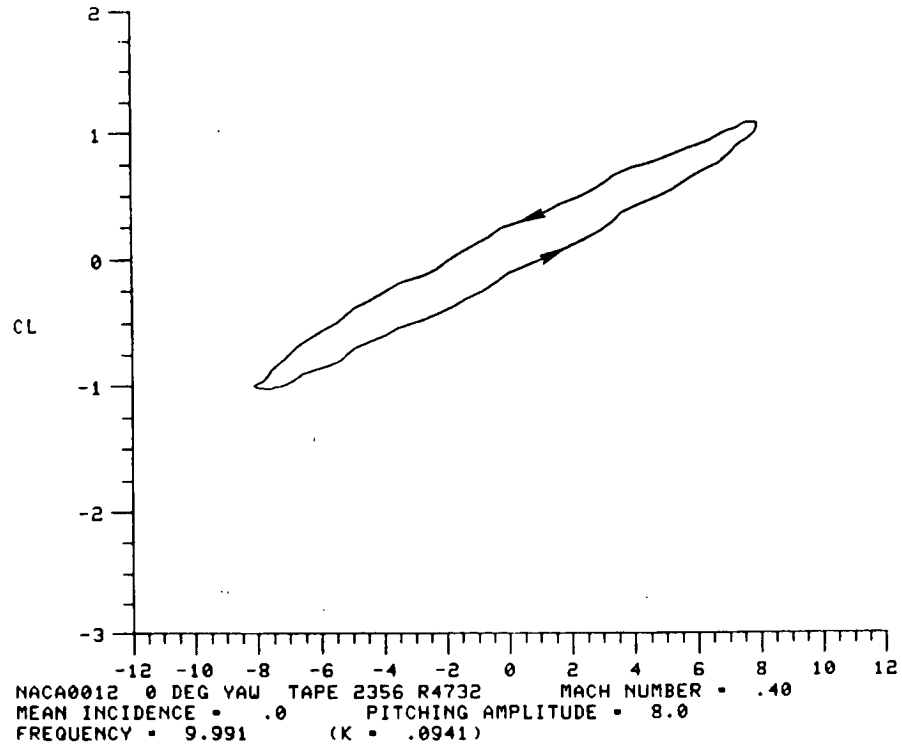


FILE 31. RUN 58.003

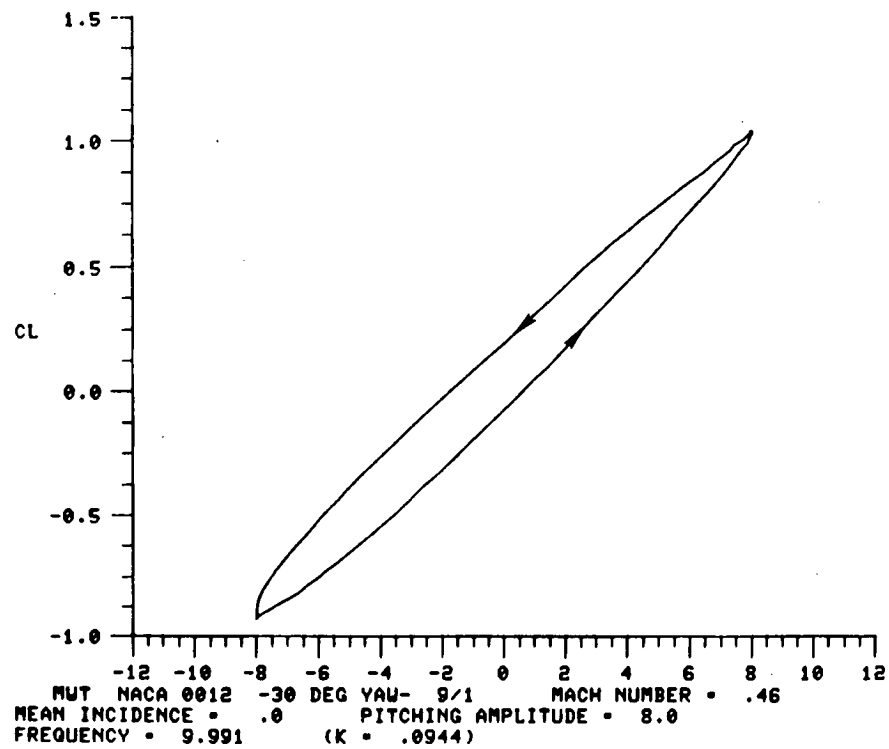


DATA WERE NOT OBTAINED

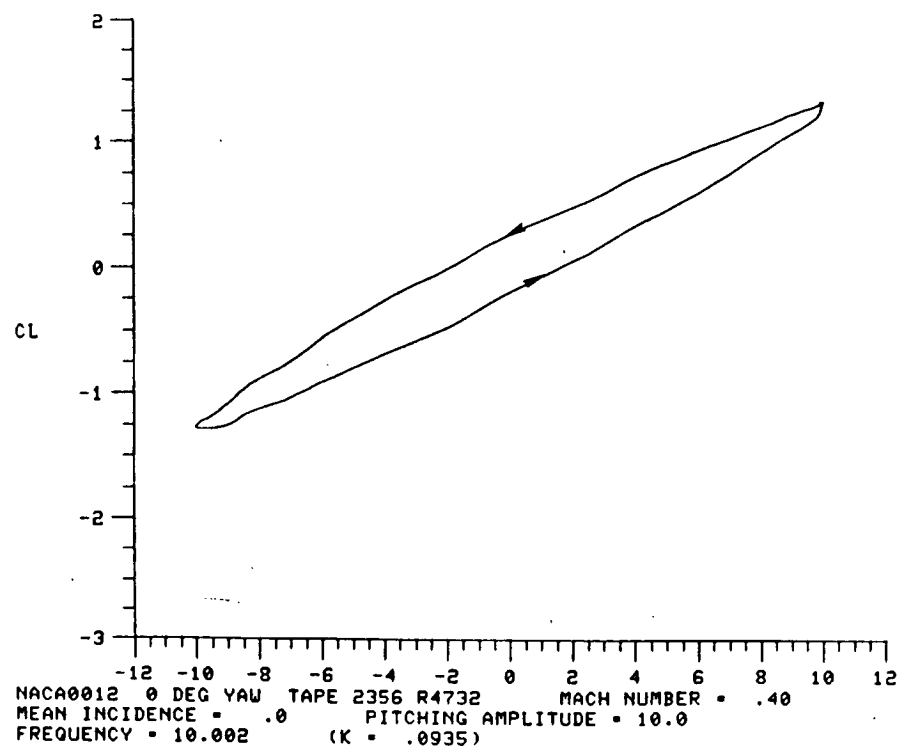
FILE 26. RUN 54.005



FILE 48. RUN1008.007

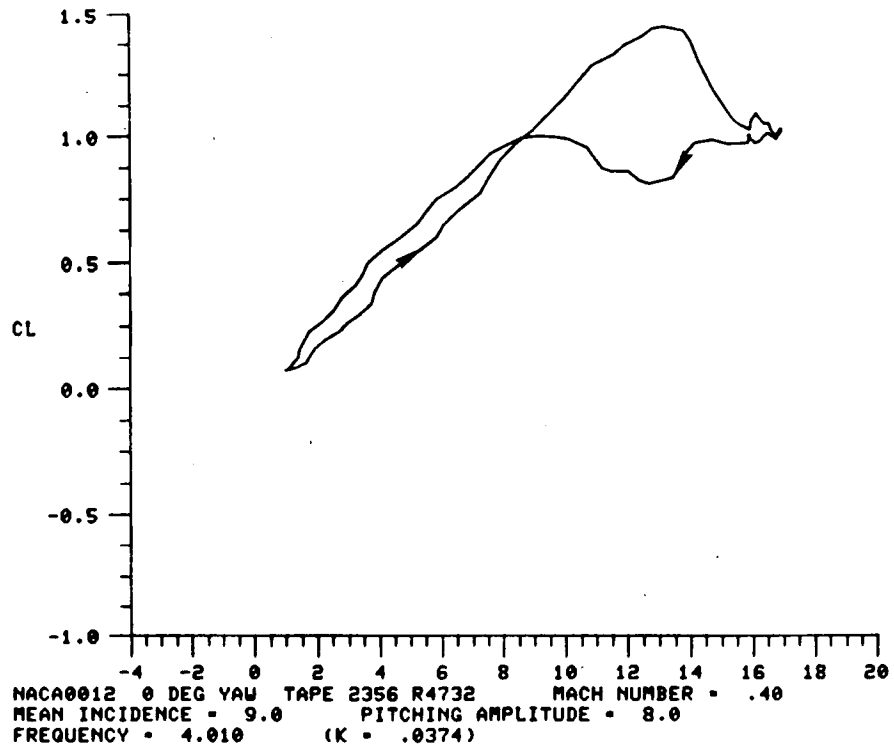


FILE 32. RUN 58.005

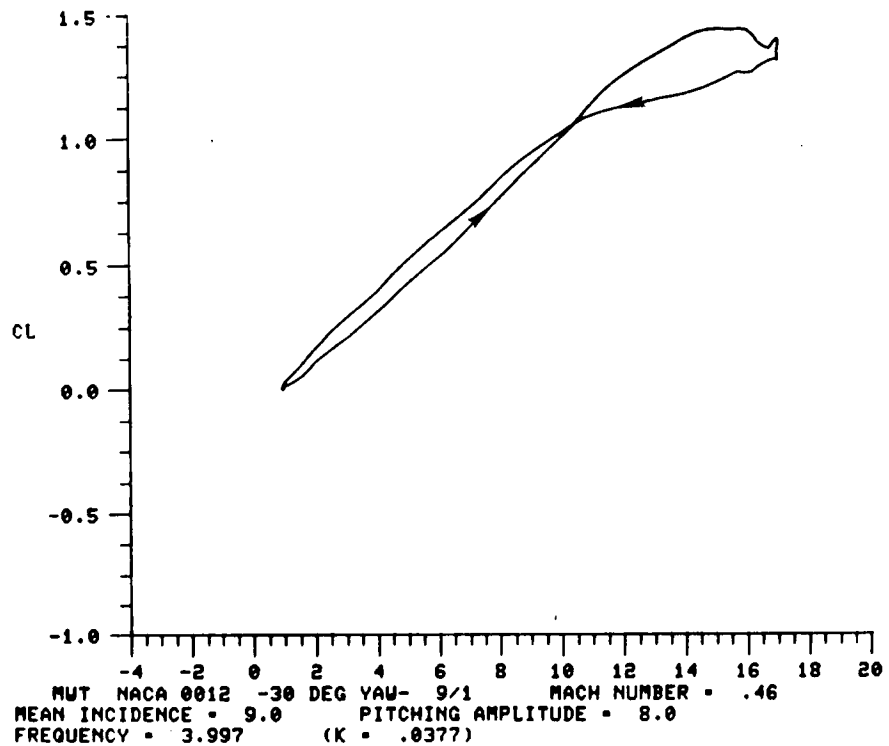


DATA WERE NOT OBTAINED

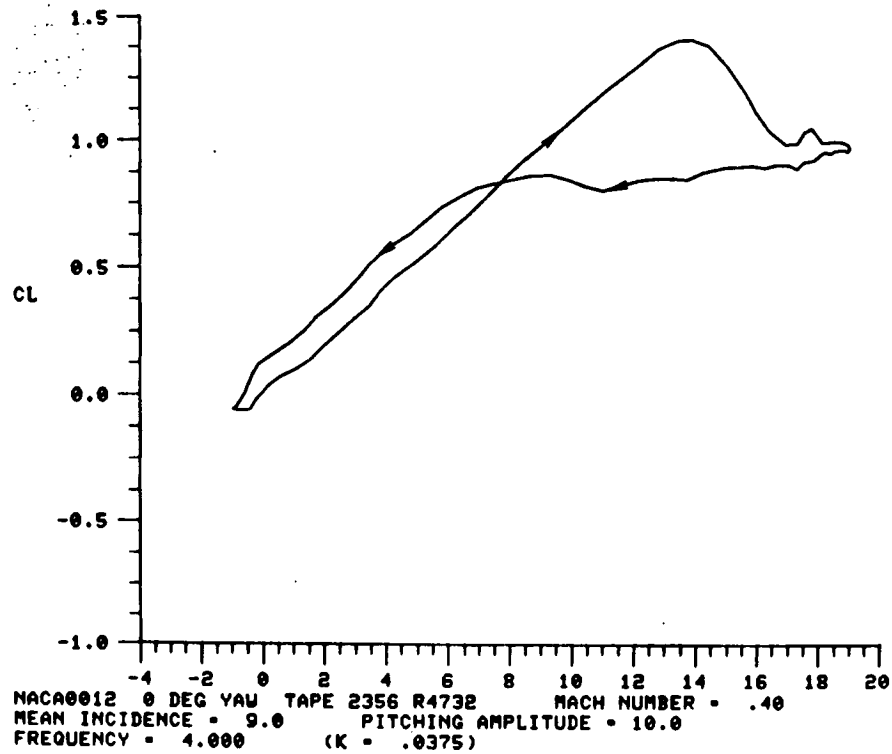
FILE 6. RUN 48.001



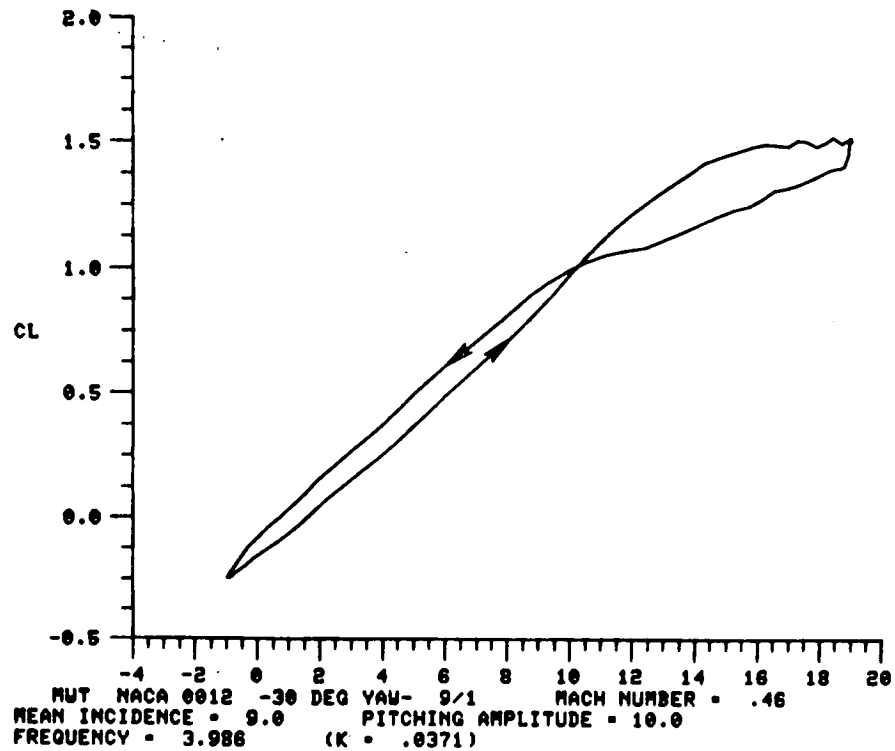
FILE 30. RUN1019.001



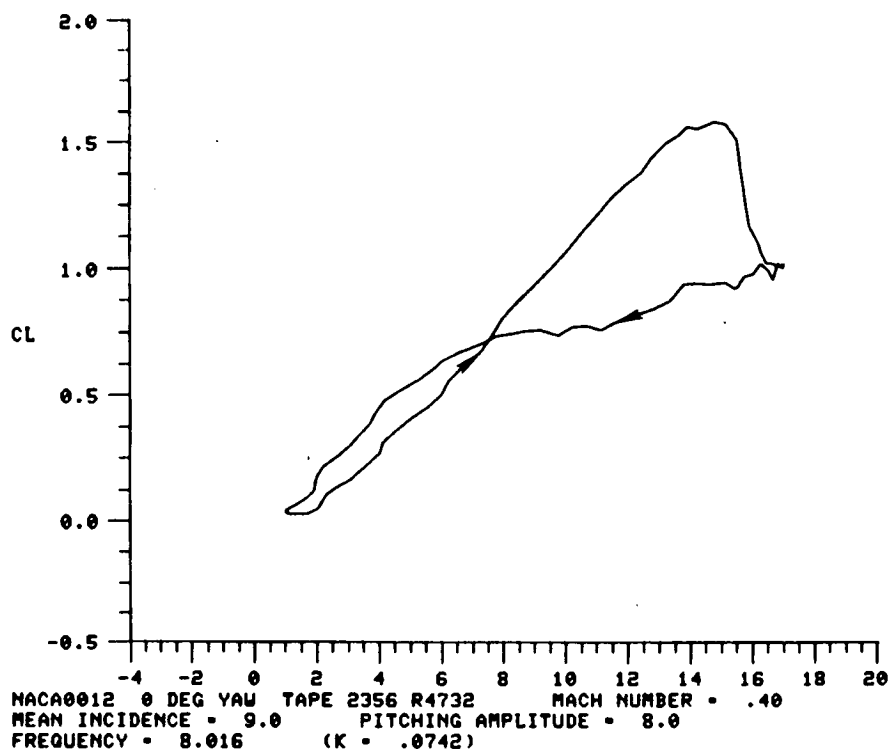
FILE 42. RUN 62.002



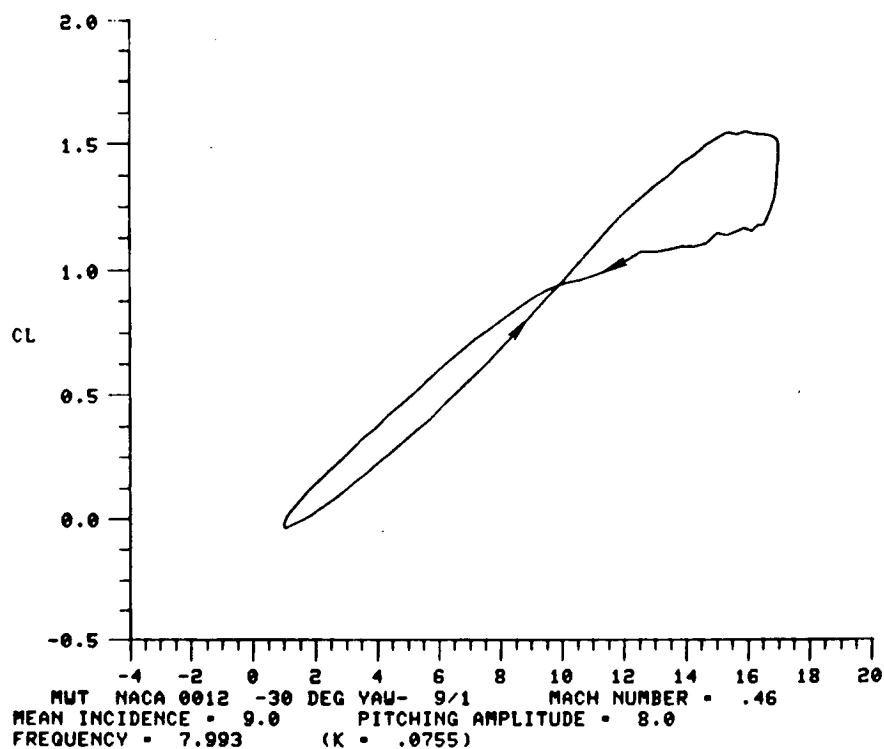
FILE 10. RUN3030.001

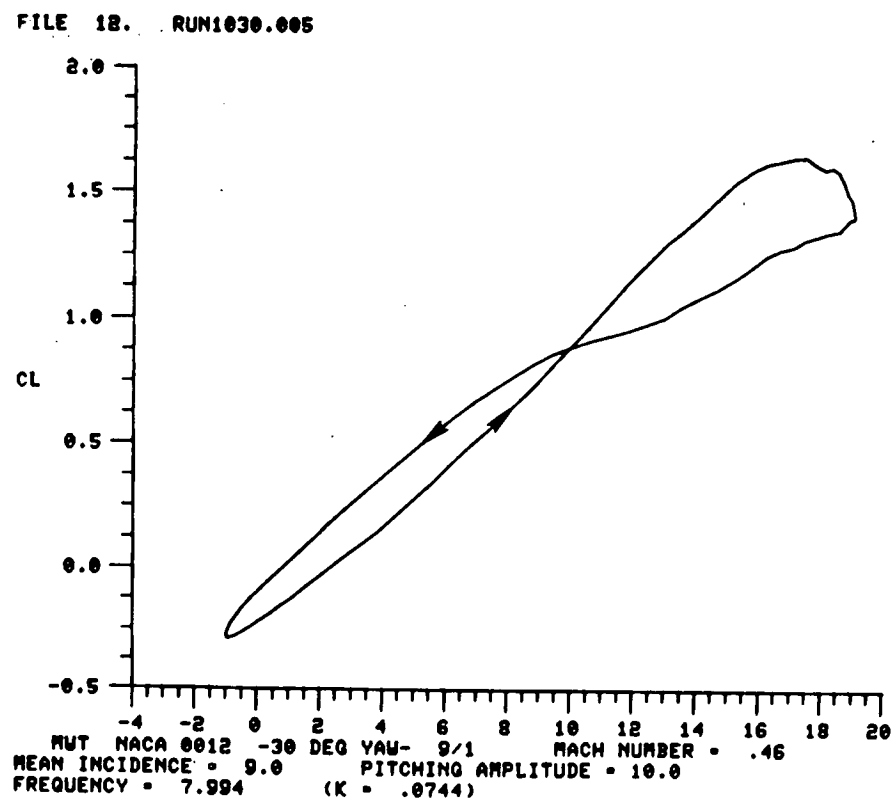
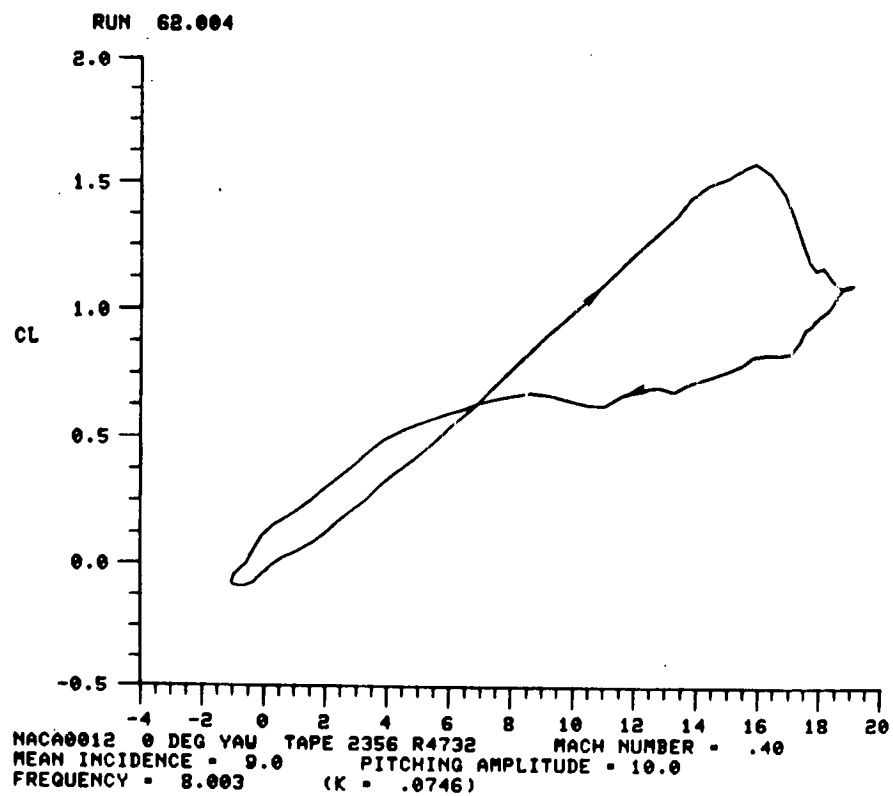


FILE 7. RUN 48.003

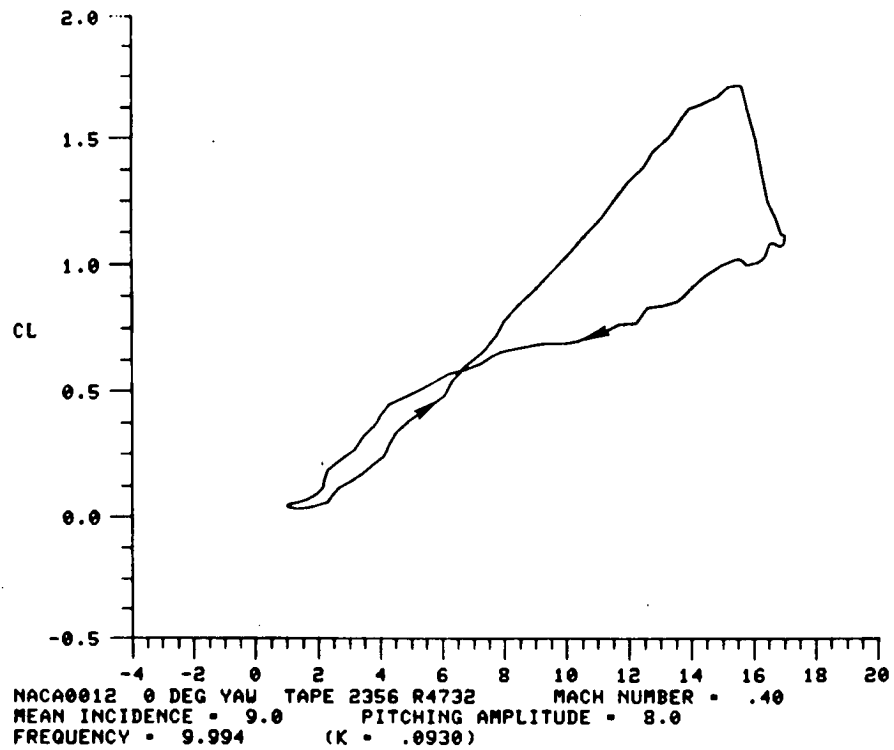


FILE 32. RUN1019.005

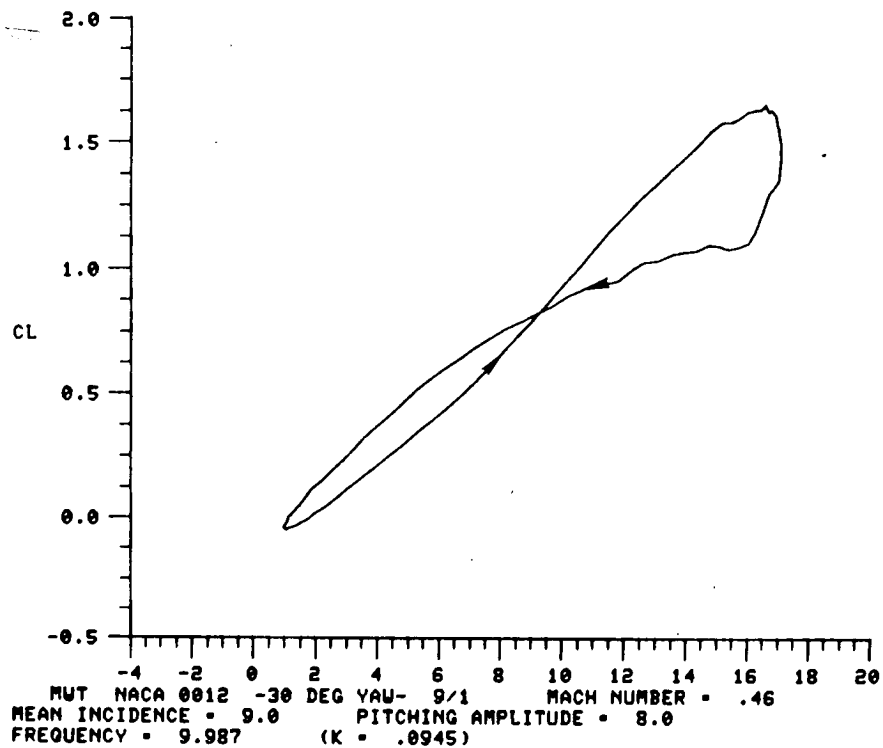




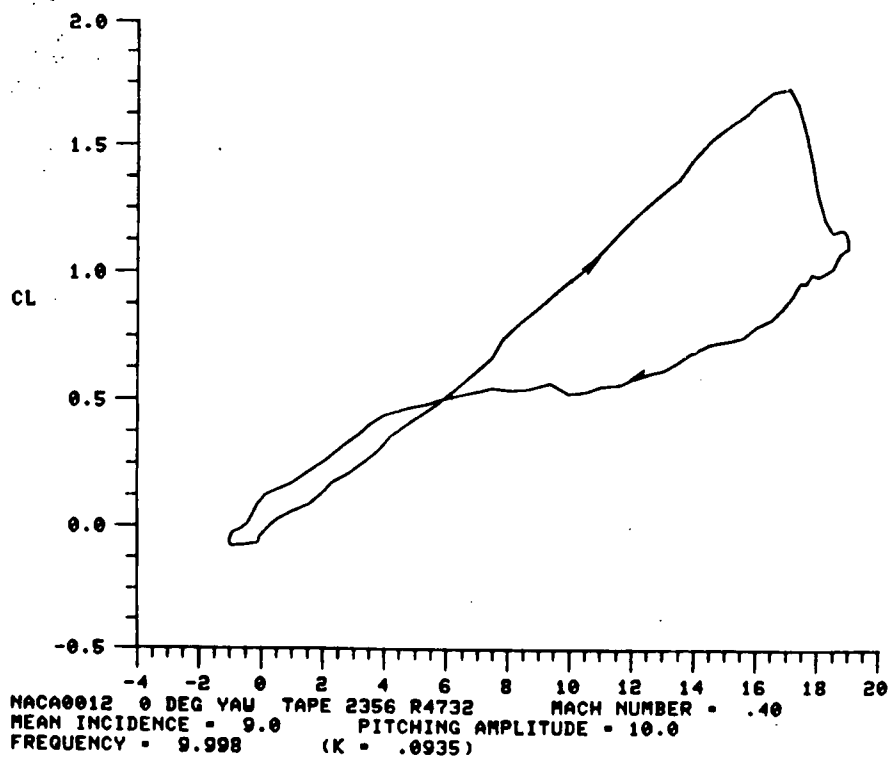
FILE 8. RUN 48.005



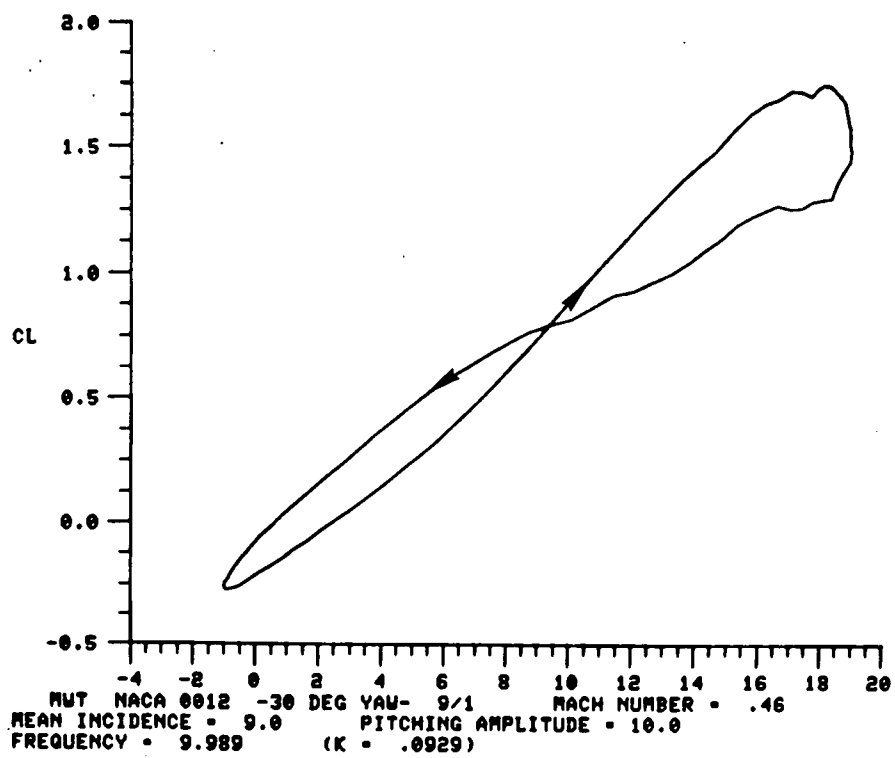
FILE 33. RUN1019.007



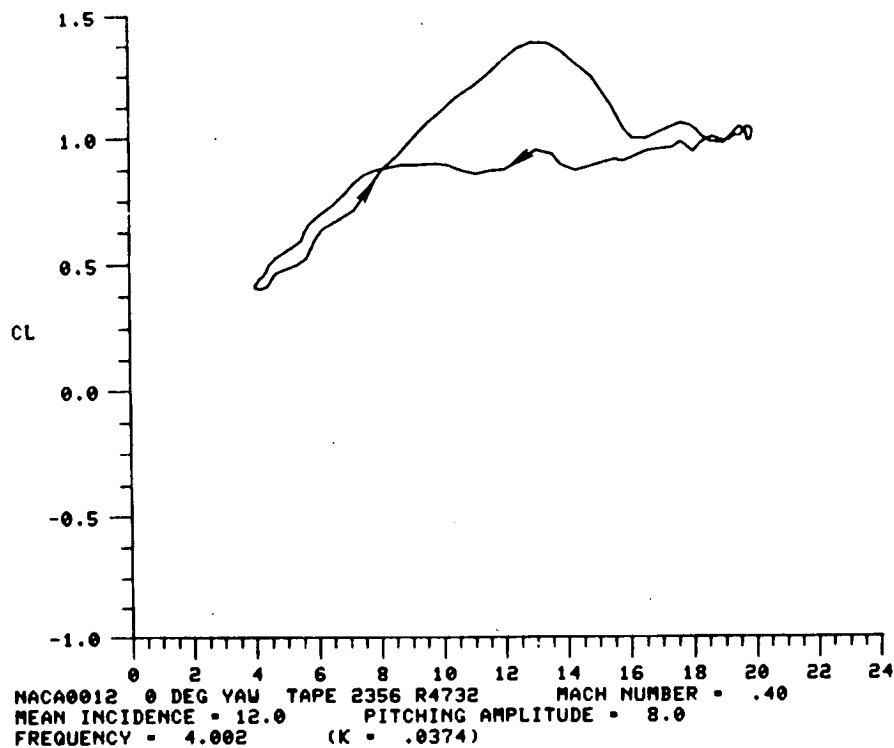
FILE 44. RUN 62.006



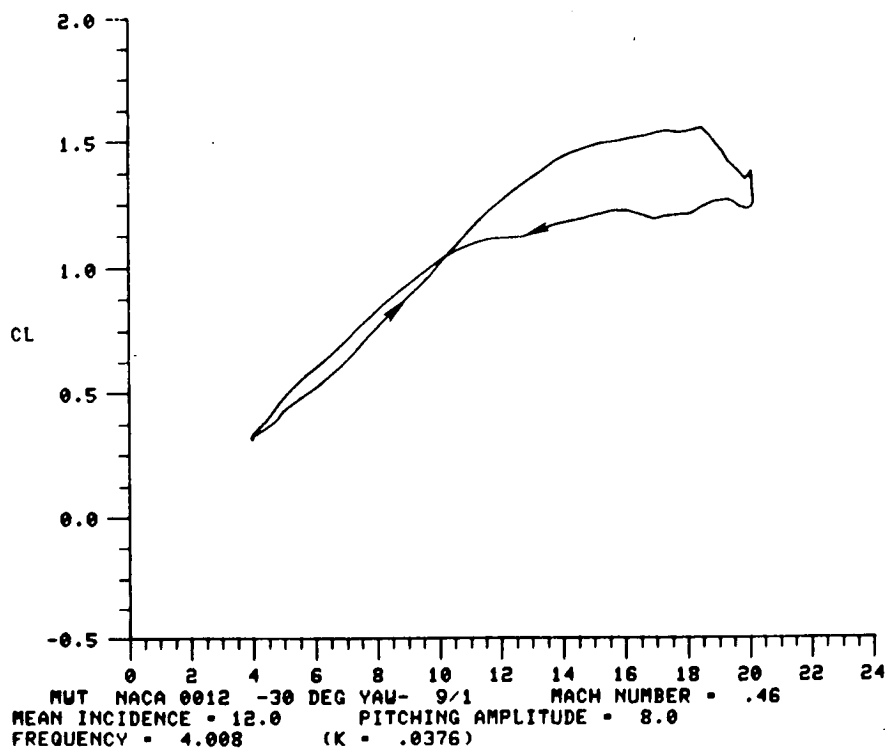
FILE 13. RUN1030.007



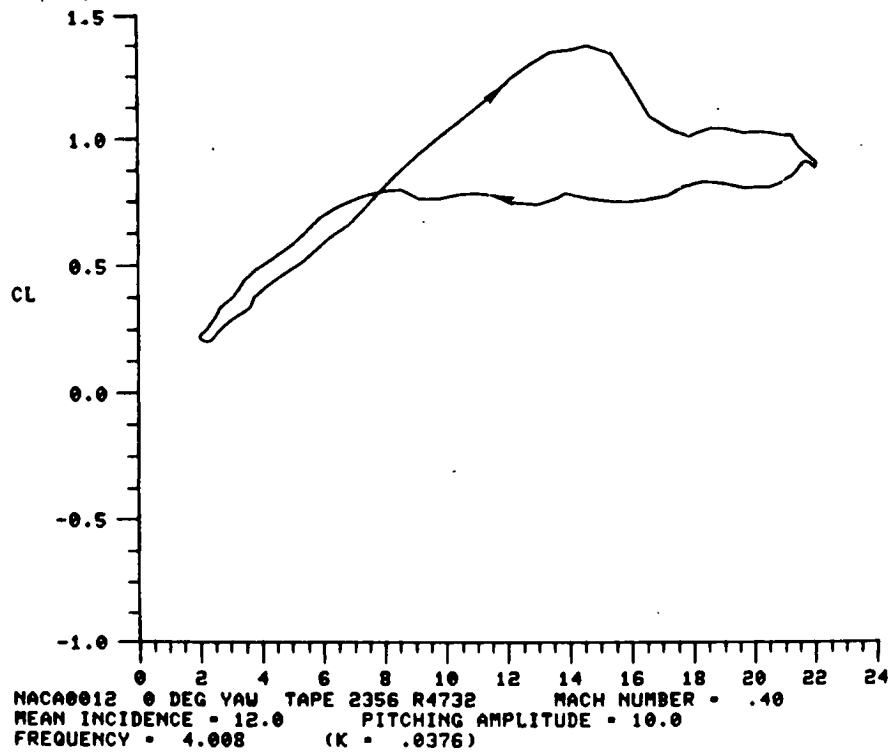
FILE 18. RUN 52.001



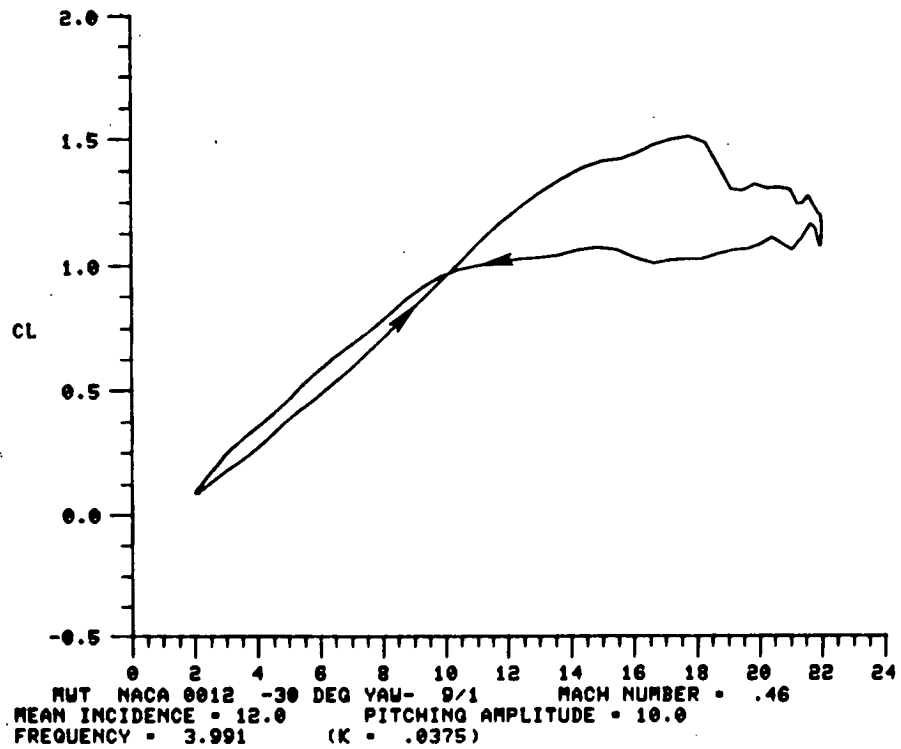
FILE 55. RUN1017.001



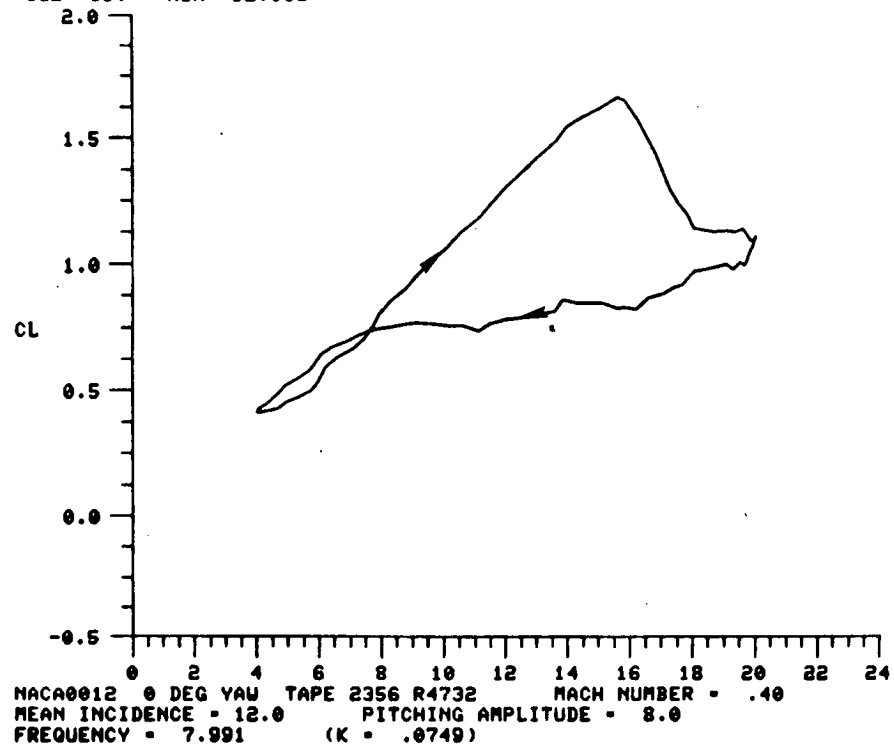
FILE 36. RUN 60.001



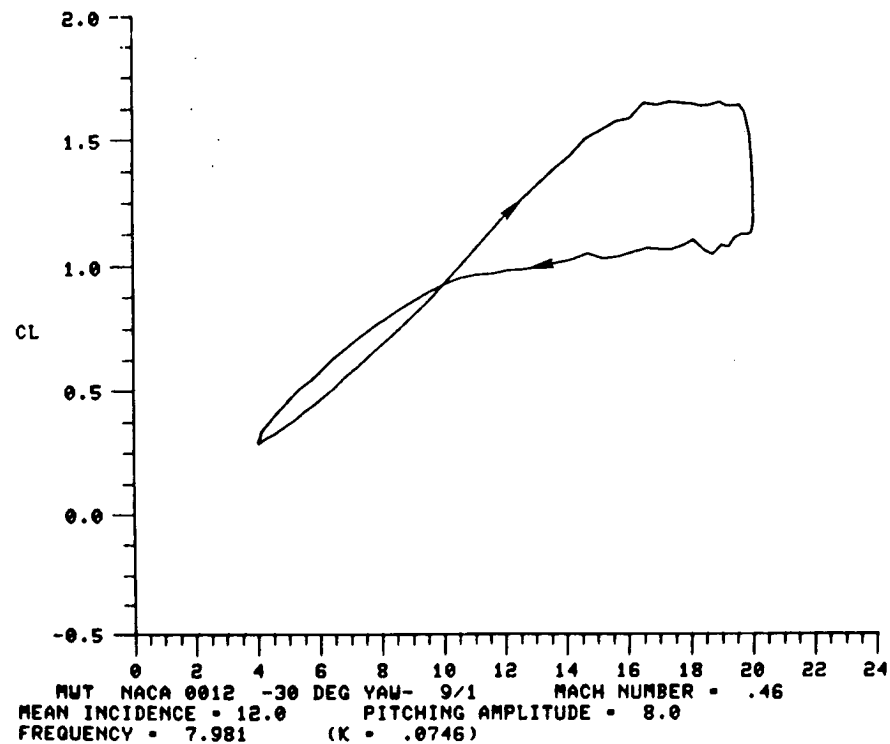
FILE 43. RUN1034.001



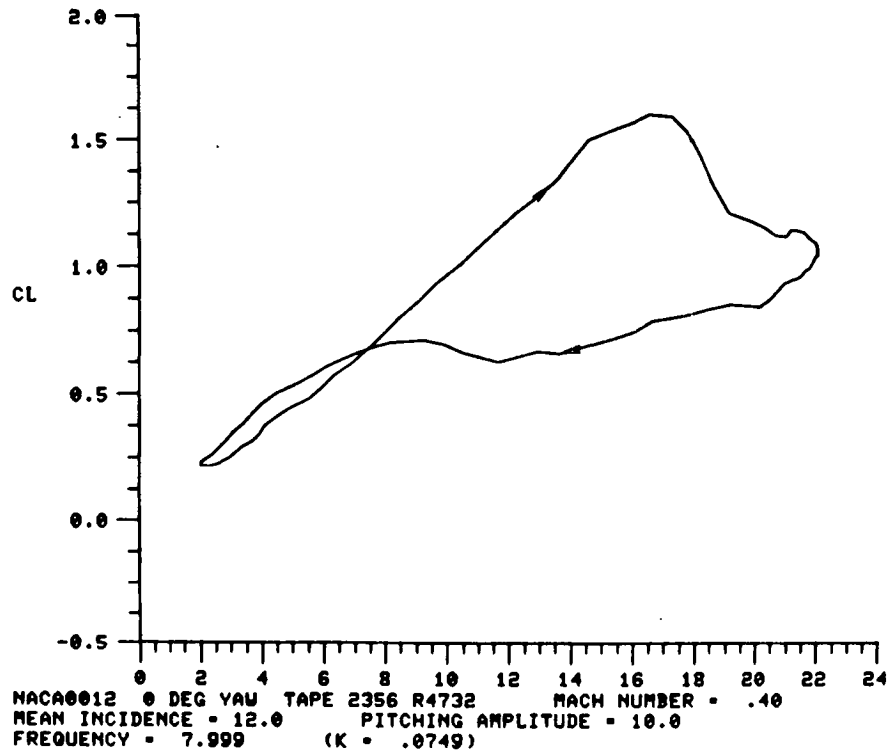
FILE 19. RUN 52.003



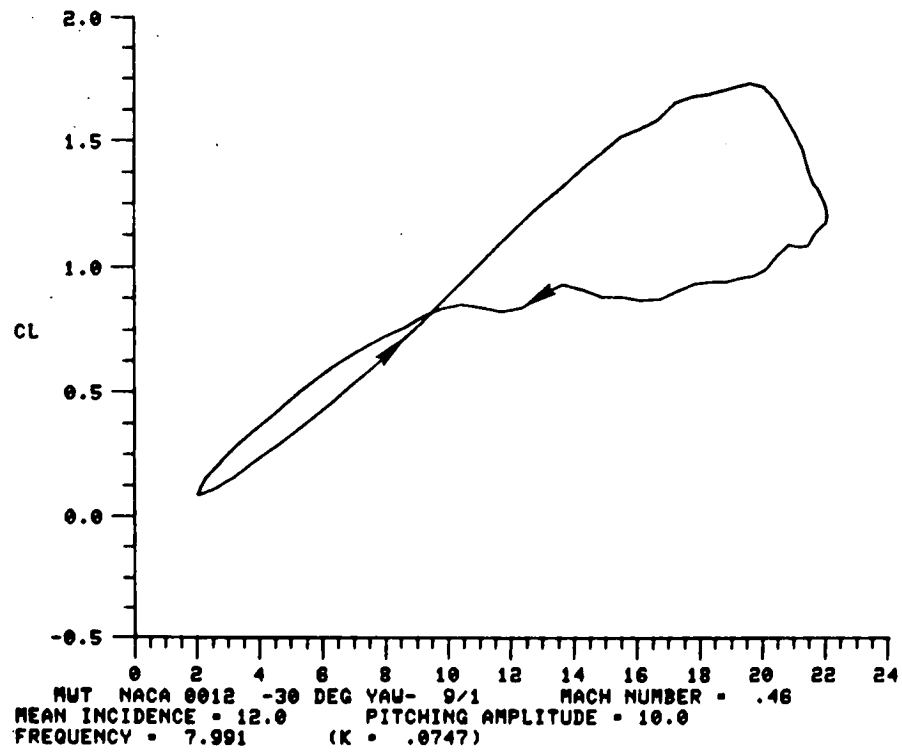
FILE 57. RUN1017.005



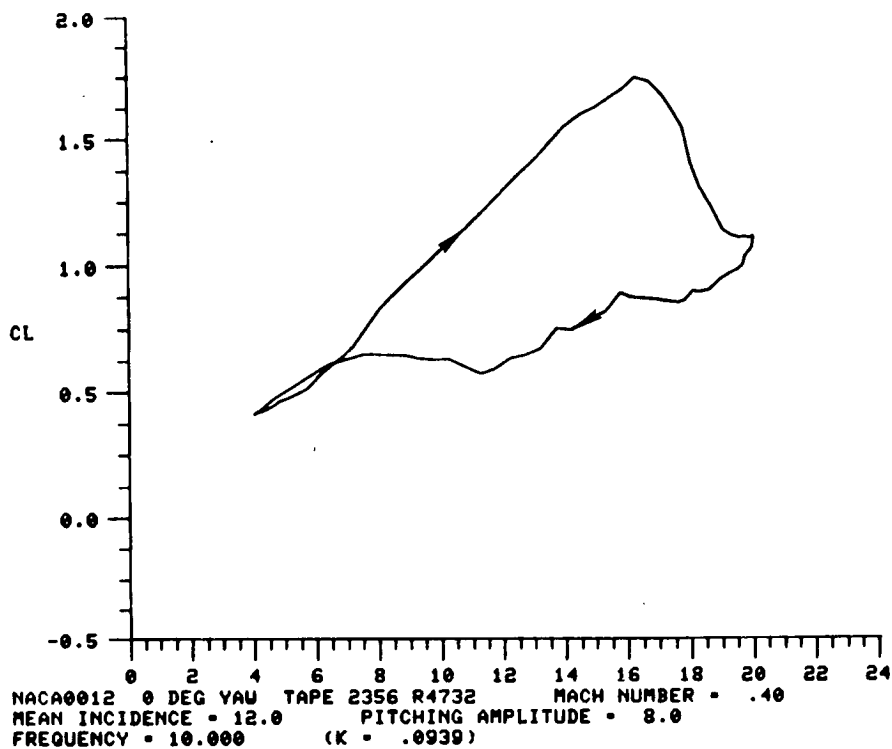
FILE 37. RUN 60.003



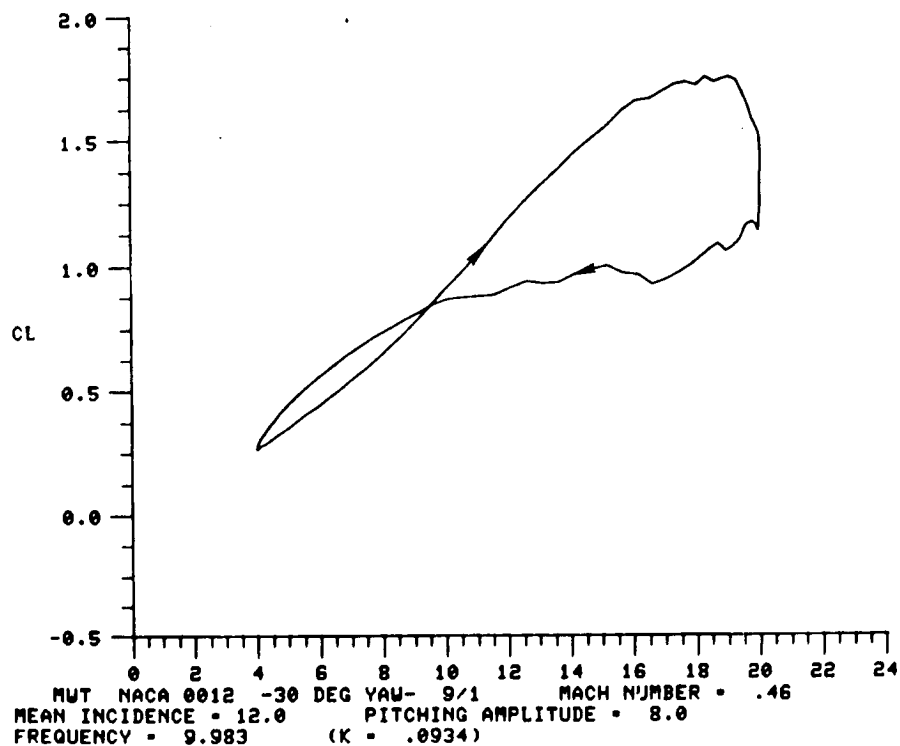
FILE 45. RUN1034.005



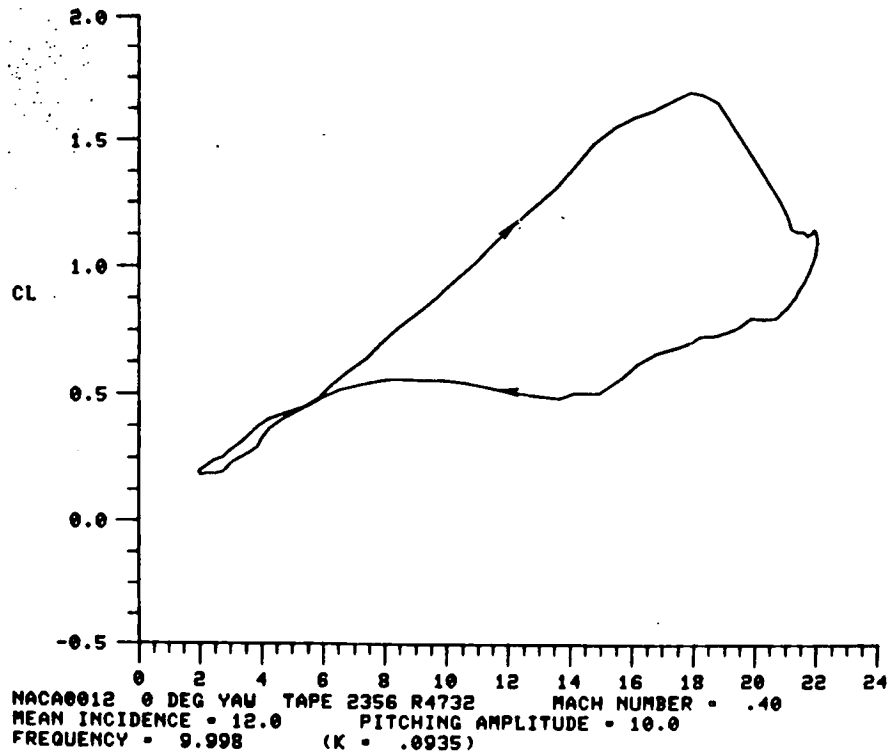
FILE 20. RUN 52.005



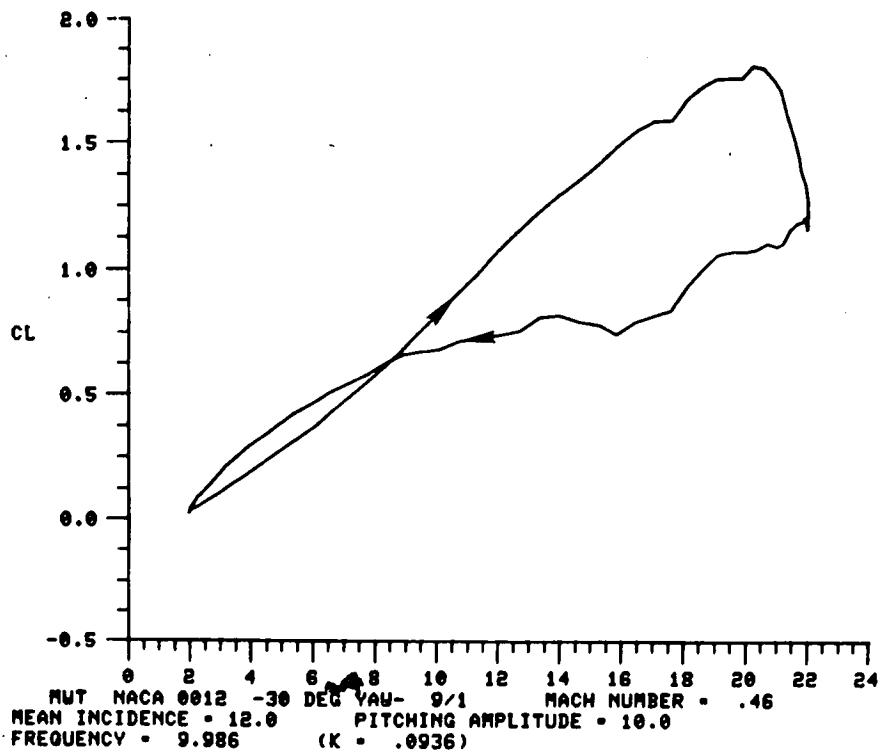
FILE 21. RUN3017.007



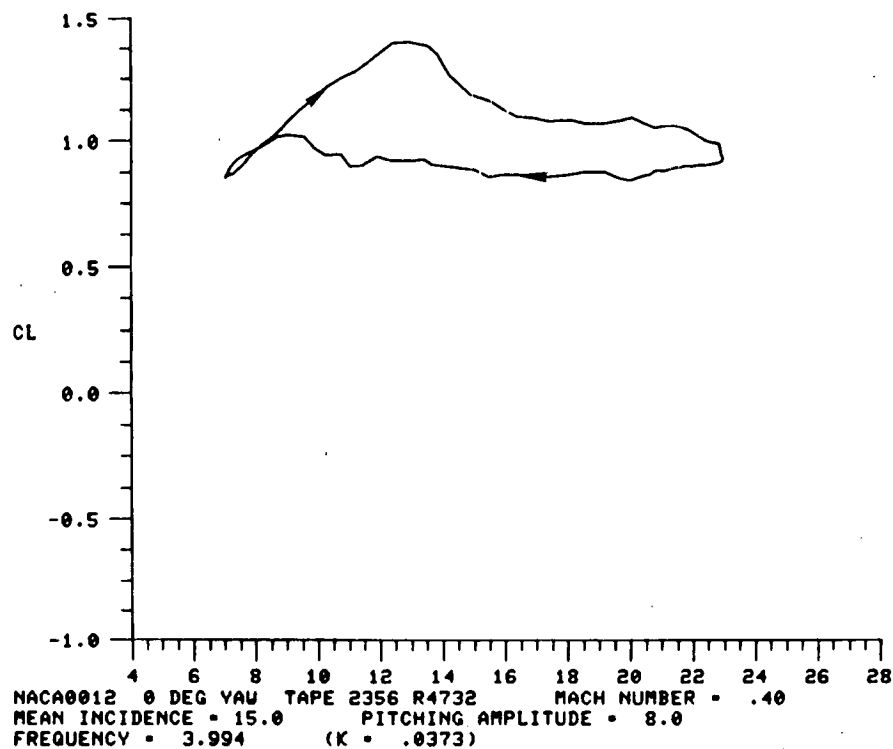
FILE 38. RUN 60.005



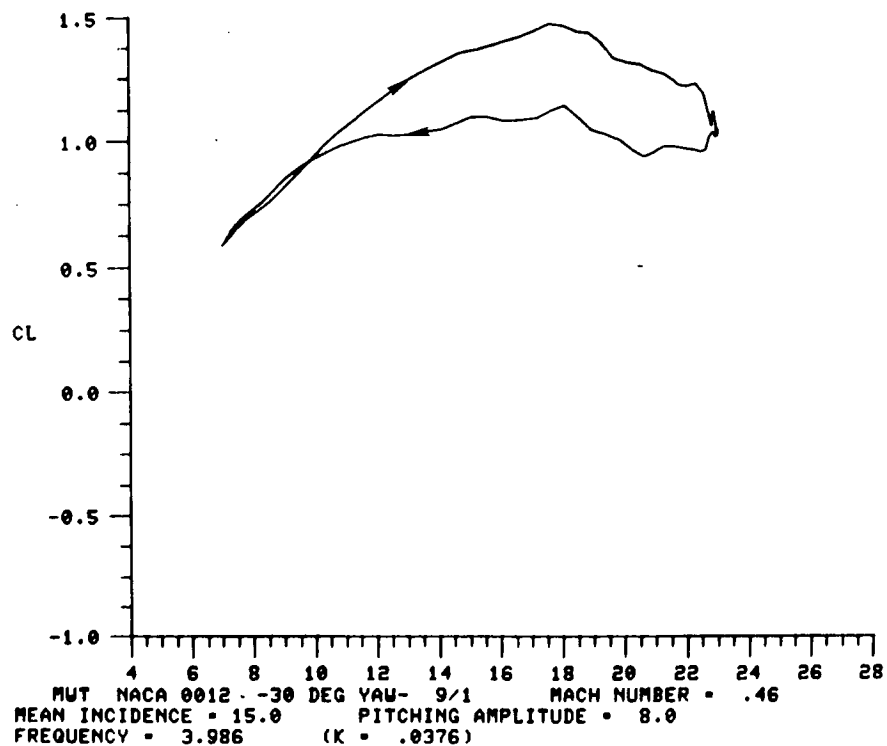
FILE 46. RUN1034.007



FILE 12. RUN 50.001

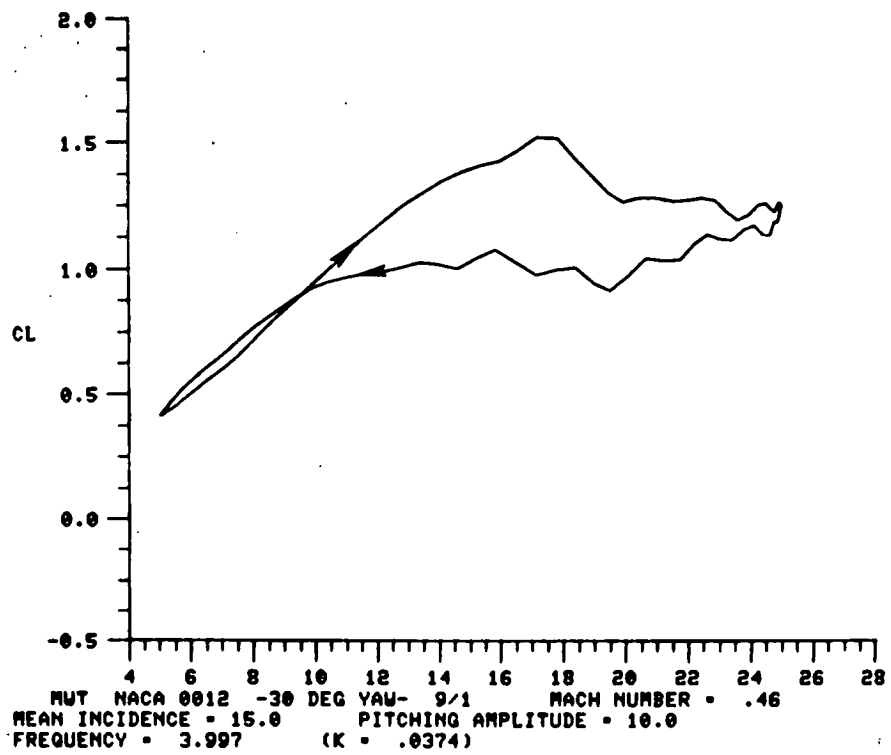


FILE 39. RUN3021.001

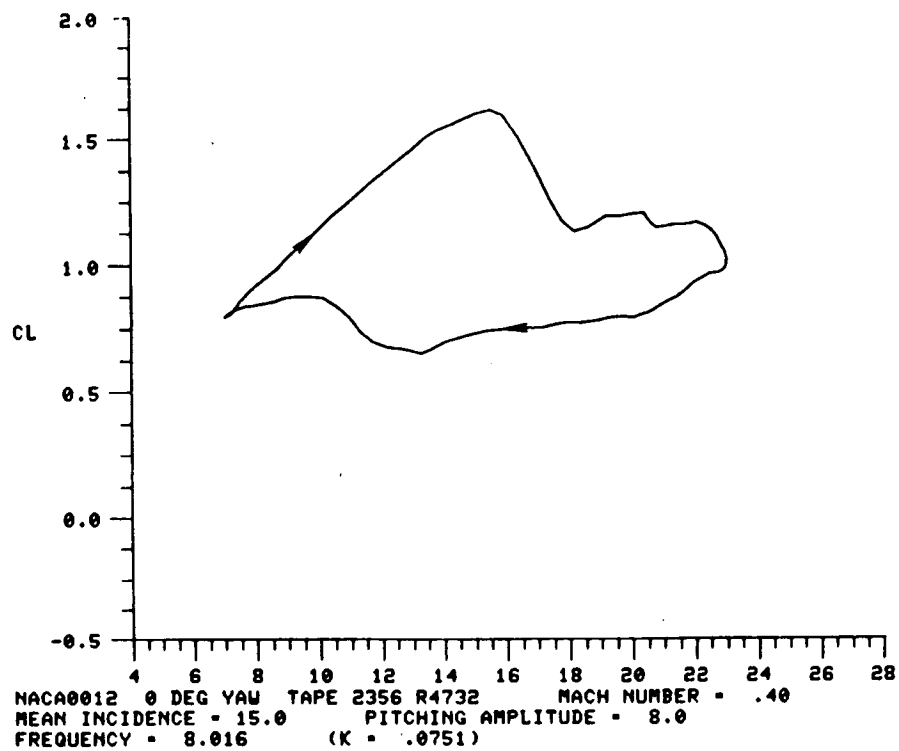


DATA WERE NOT OBTAINED

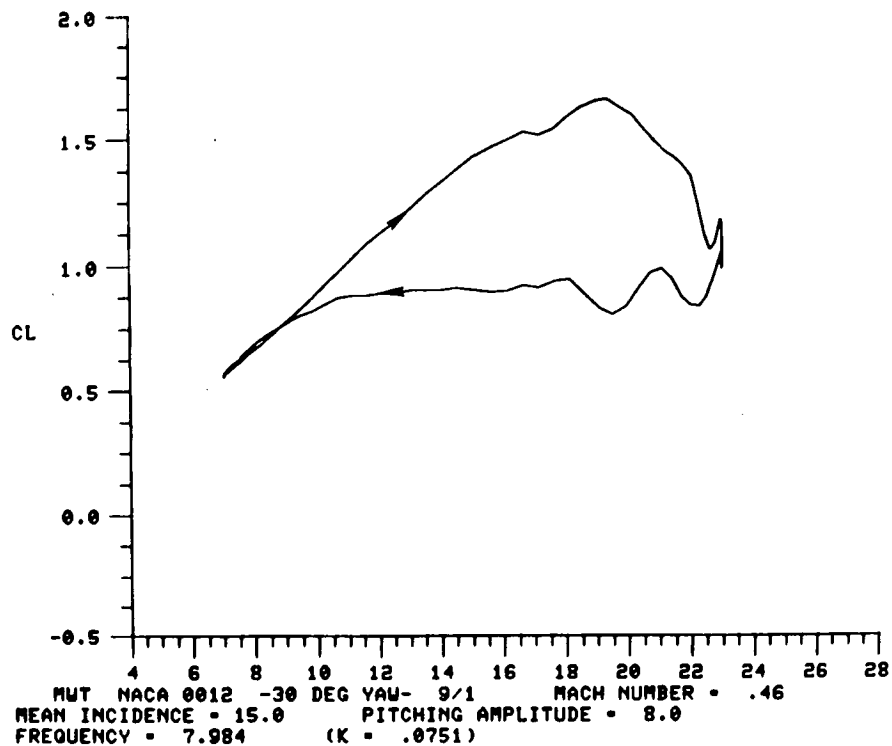
FILE 57. RUN1037.001



FILE 13. RUN 50.004

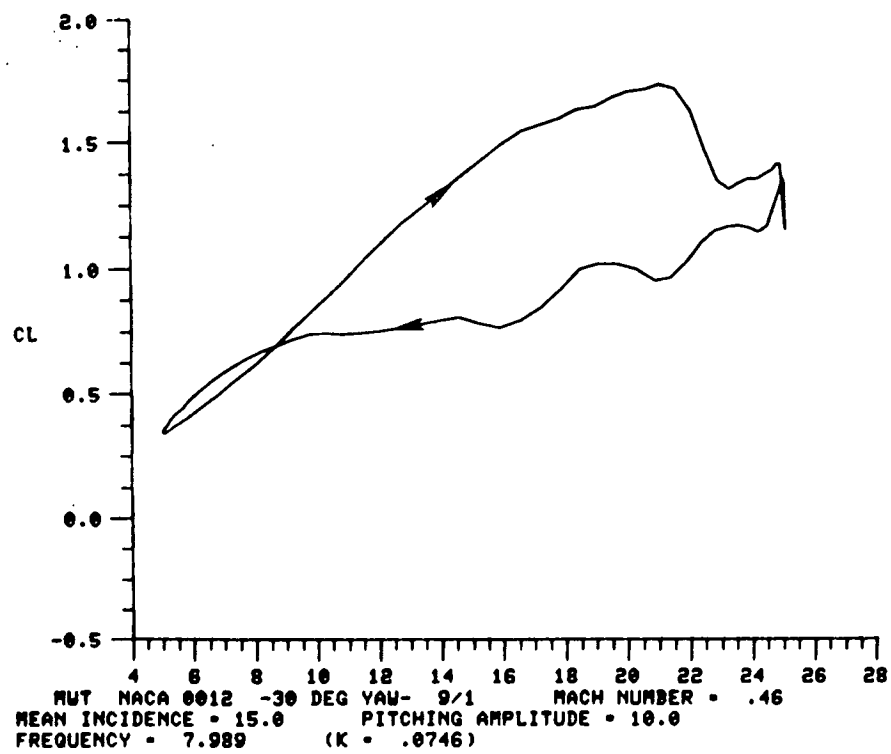


FILE 63. RUN1021.005

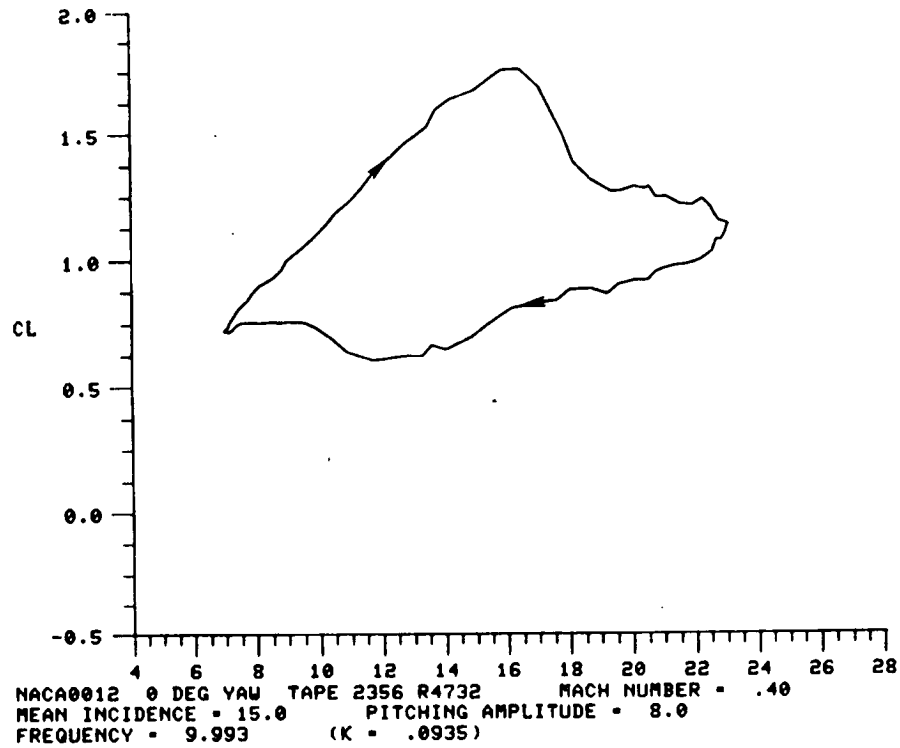


DATA WERE NOT OBTAINED

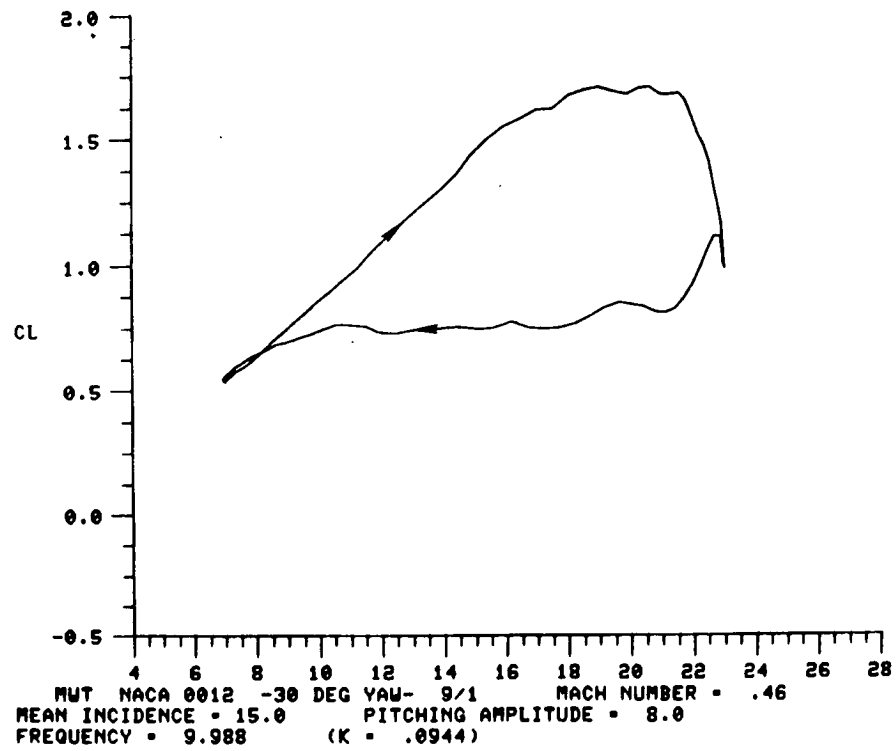
FILE 59. RUN1037.005



FILE 14. RUN 50.006

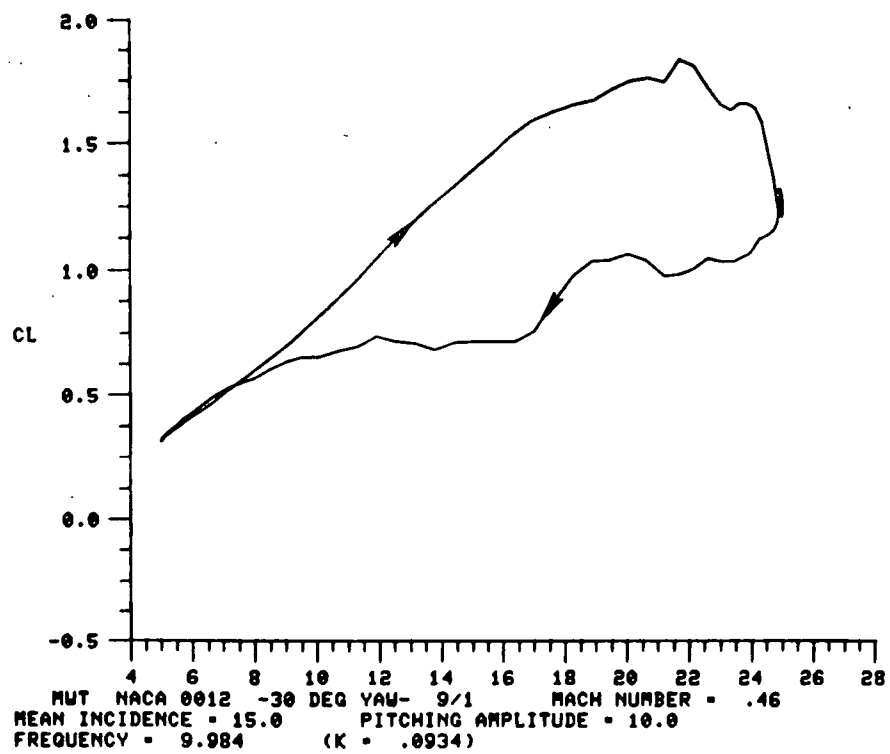


FILE 64. RUN1021.008



DATA WERE NOT OBTAINED

FILE 60. RUN1037.007

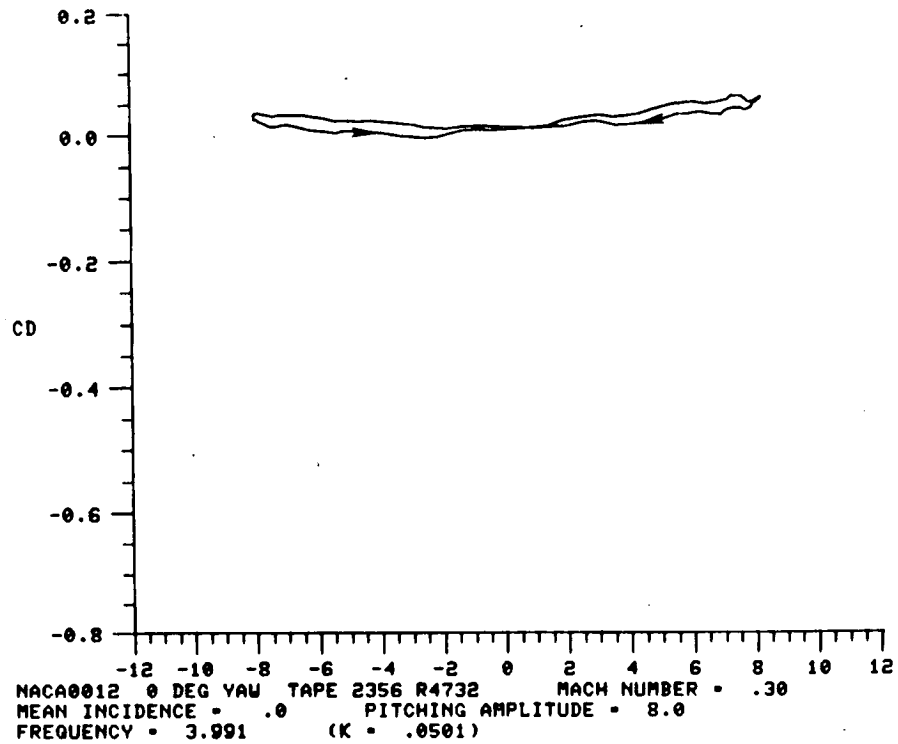


EFFECT OF SWEEP ON THE PRESSURE DRAG RESPONSE *

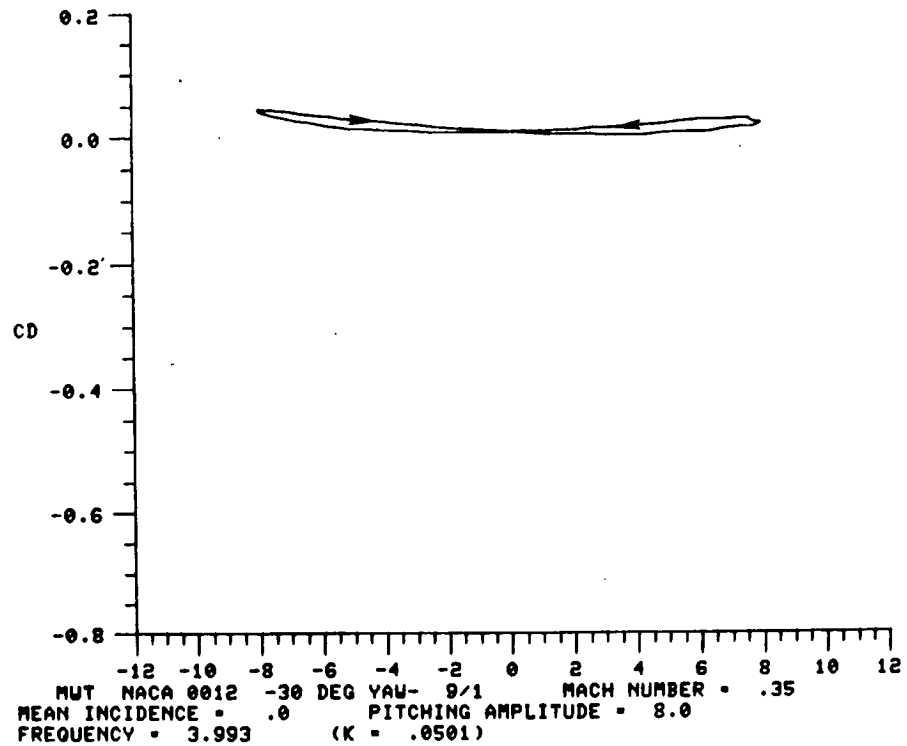
<u>Chordwise Mach Number</u>	<u>Mean Incidence Angle</u>	<u>Frequency</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0.30 ↓	0	4.0	.050	158,159
	↓	8.0	.100	160,161
		10.0	.124	162,163
	9	4.0	.050	164,165
	↓	8.0	.100	166,167
		10.0	.124	168,169
	12	4.0	.050	170,171
	↓	8.0	.100	172,173
		10.0	.124	174,175
	15	4.0	.050	176,177
	↓	8.0	.100	178,179
		10.0	.124	180,181
0.40 ↓	0	4.0	.037	182,183
	↓	8.0	.075	184,185
		10.0	.093	186,187
	9	4.0	.037	188,189
	↓	8.0	.075	190,191
		10.0	.093	192,193
	12	4.0	.037	194,195
	↓	8.0	.075	196,197
		10.0	.093	198,199
	15	4.0	.037	200,201
	↓	8.0	.075	202,203
		10.0	.093	204,205

* The effect of sweep is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

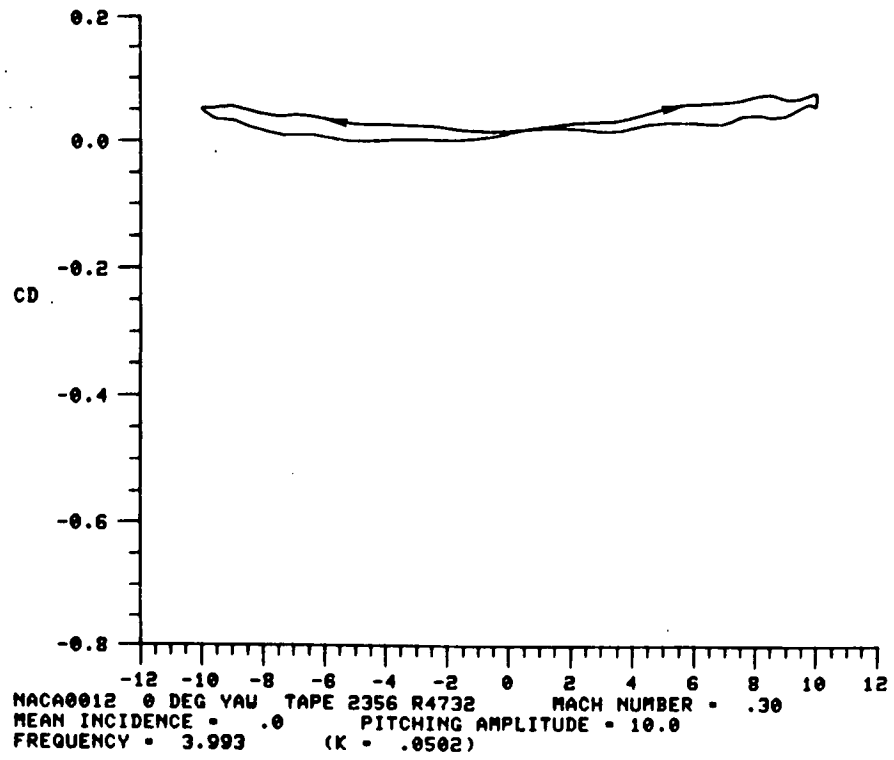
FILE 21. RUN 53.001



FILE 8. RUN1007.005

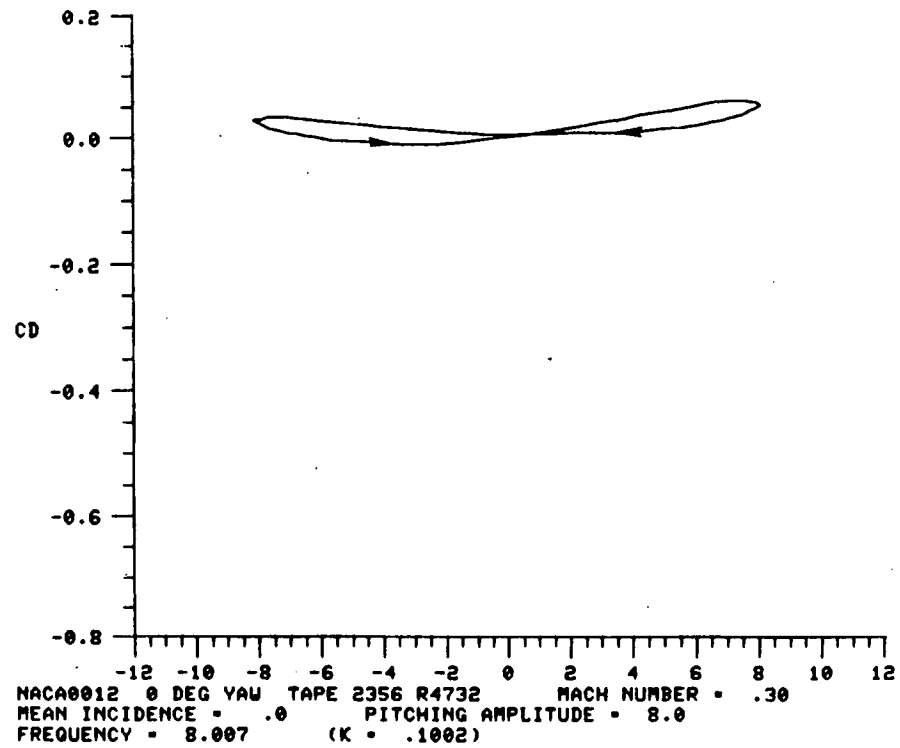


FILE 27. RUN 57.001

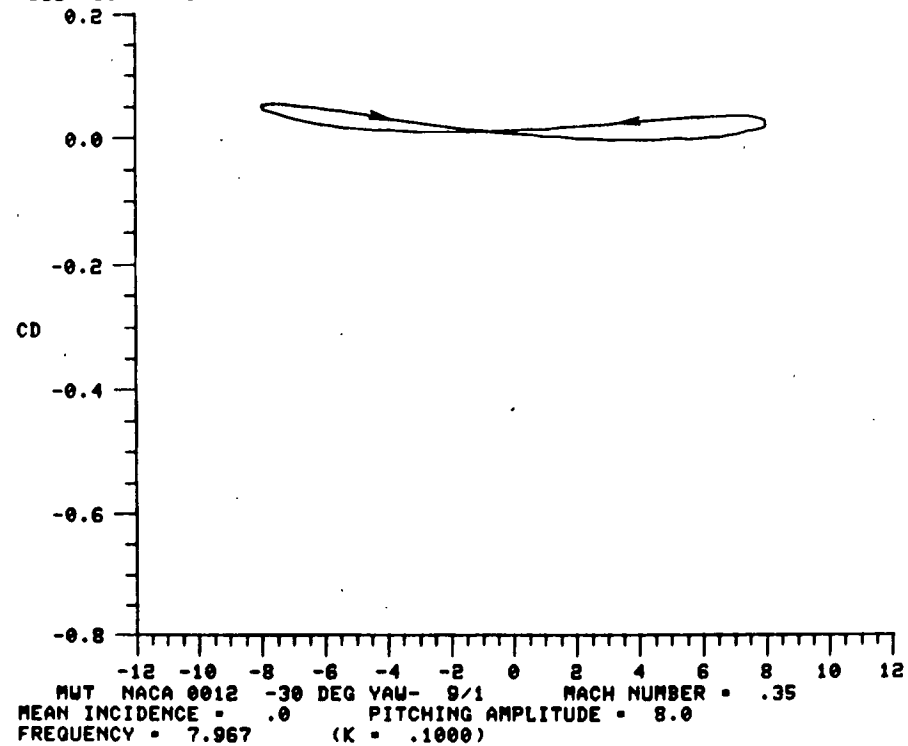


DATA WERE NOT OBTAINED

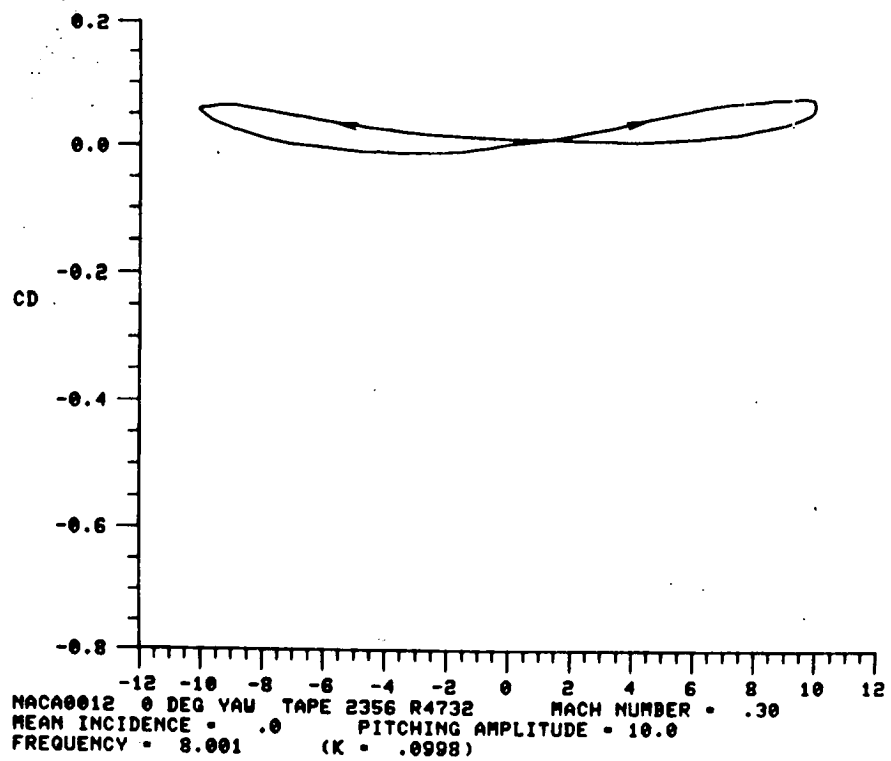
FILE 22. RUN 53.003



FILE 10. RUN1007.009

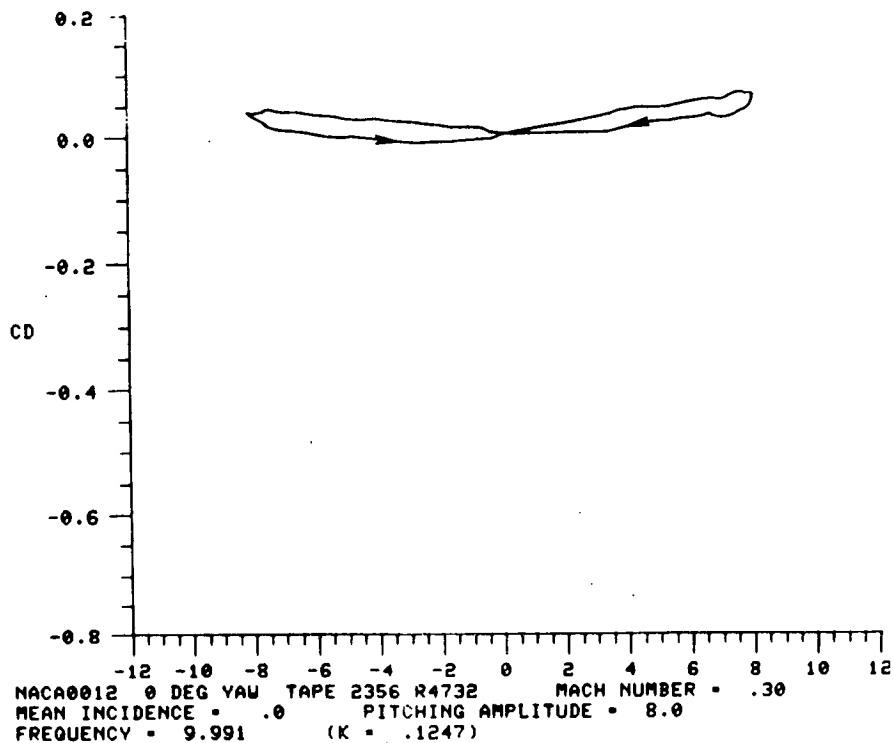


FILE 28. RUN 57.003

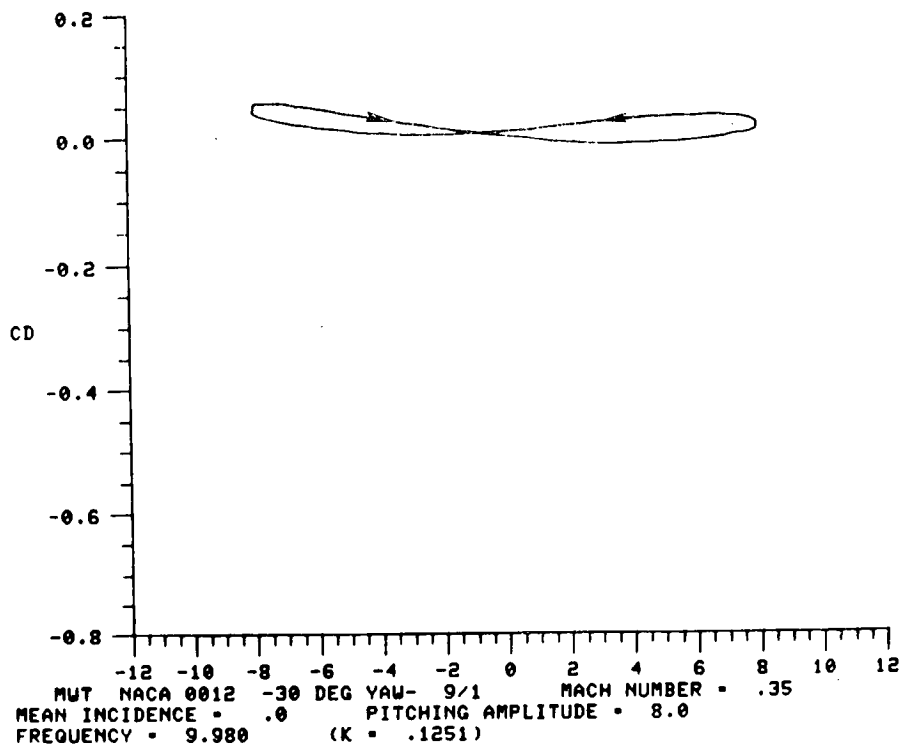


DATA WERE NOT OBTAINED

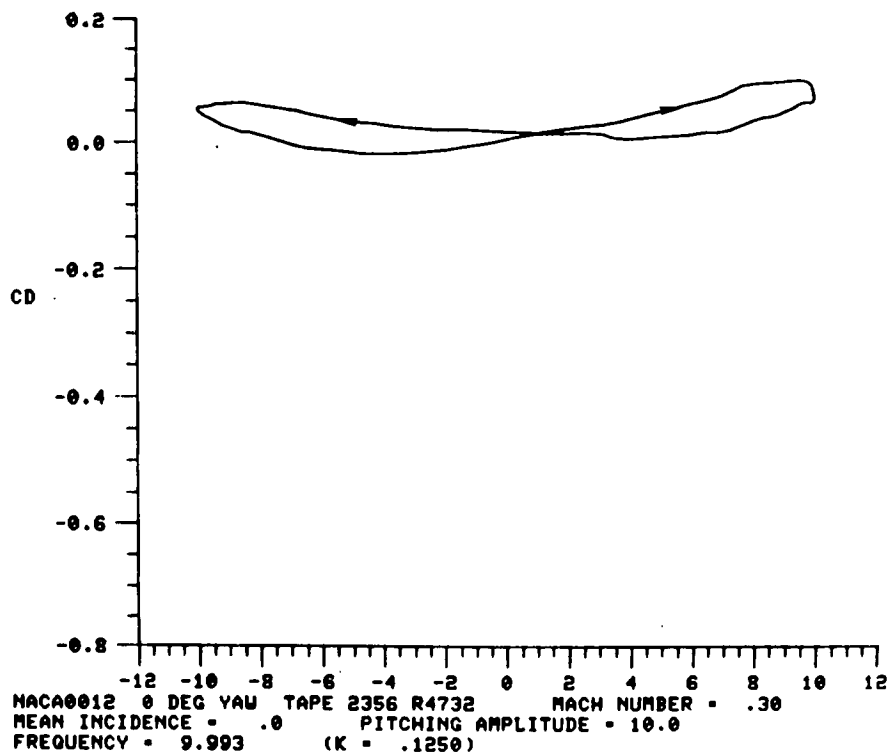
FILE 23. RUN 53.005



FILE 11. RUN1007.011

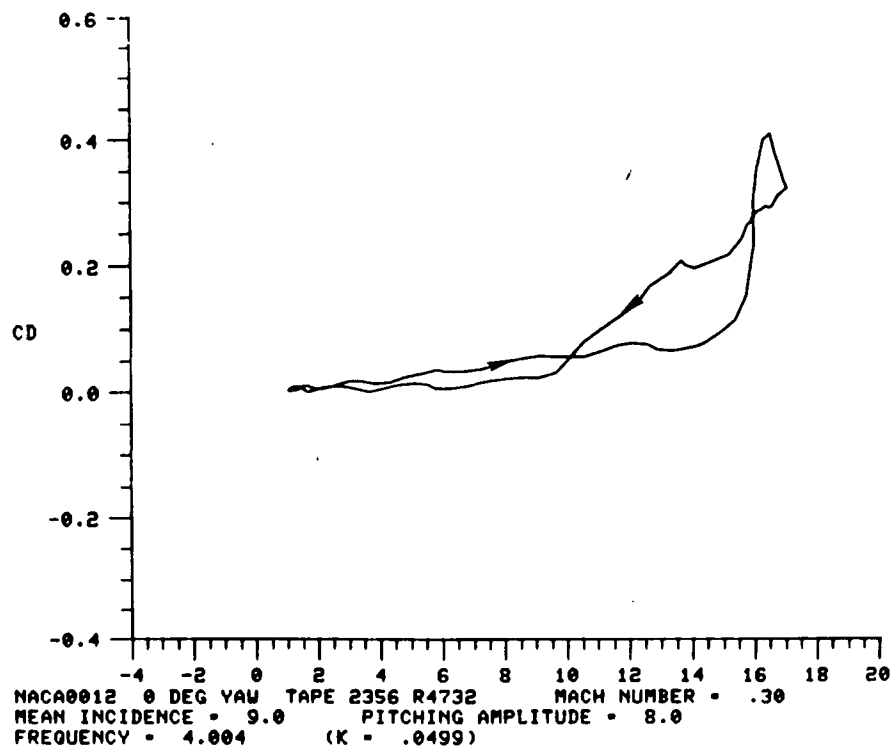


FILE 89. RUN 57.005

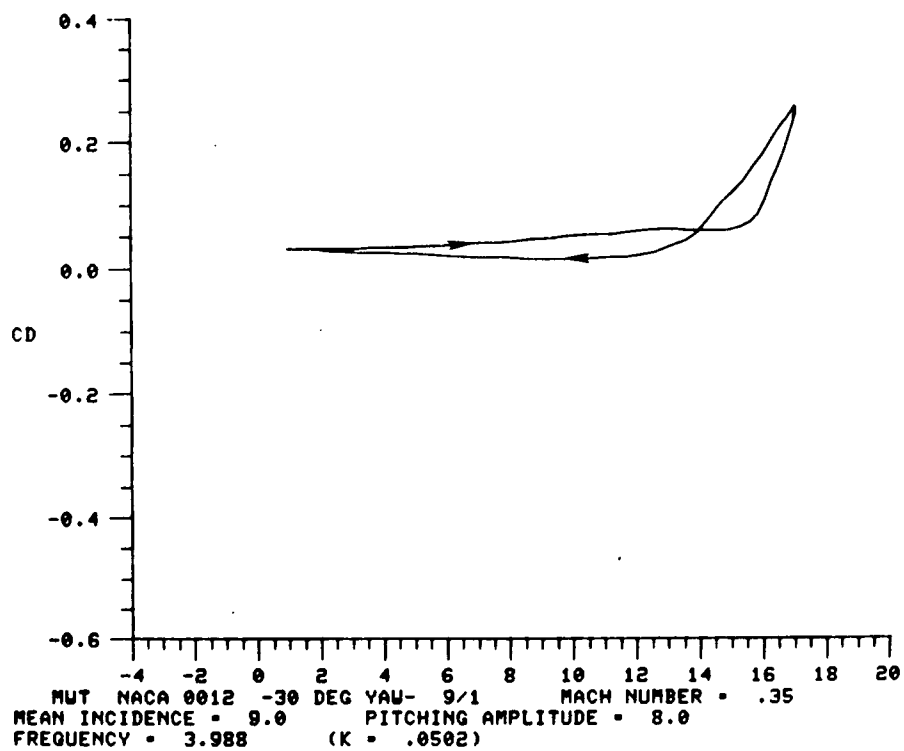


DATA WERE NOT OBTAINED

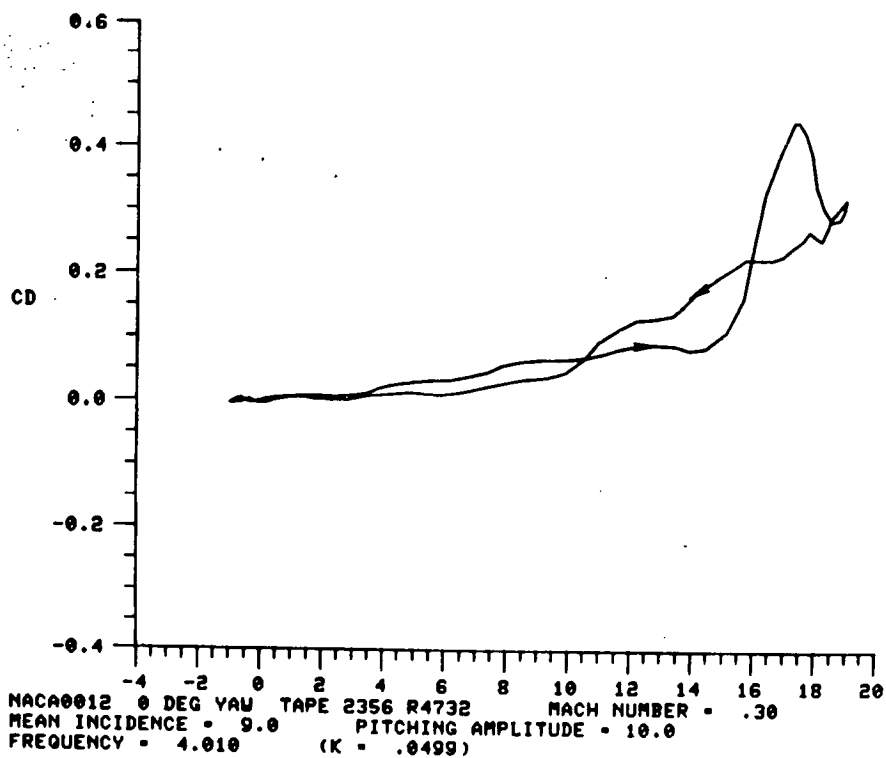
FILE 3. RUN 47.001



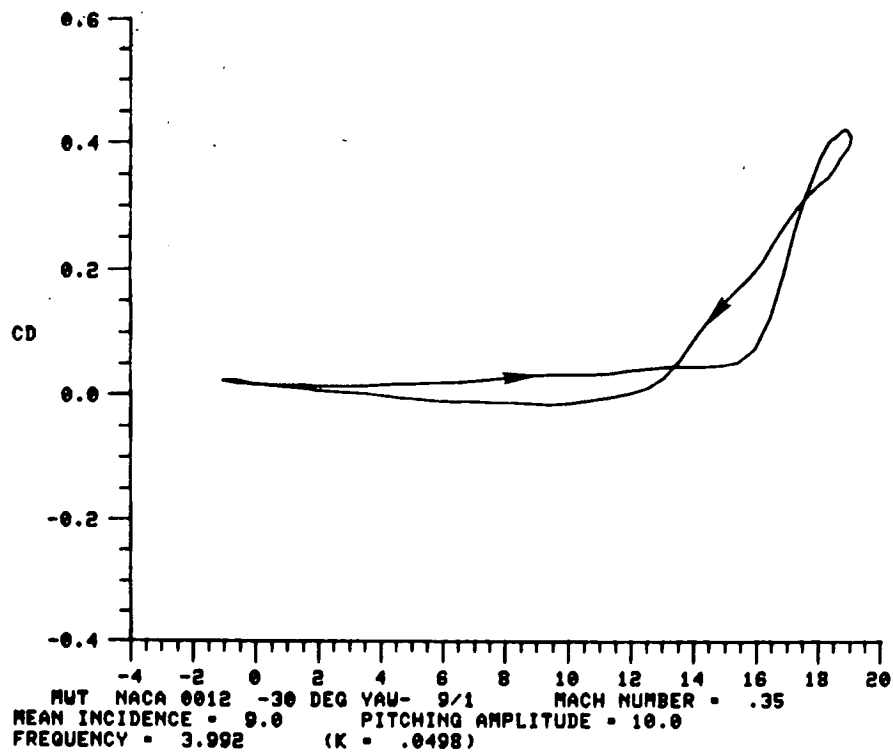
FILE 26. RUN1018.013



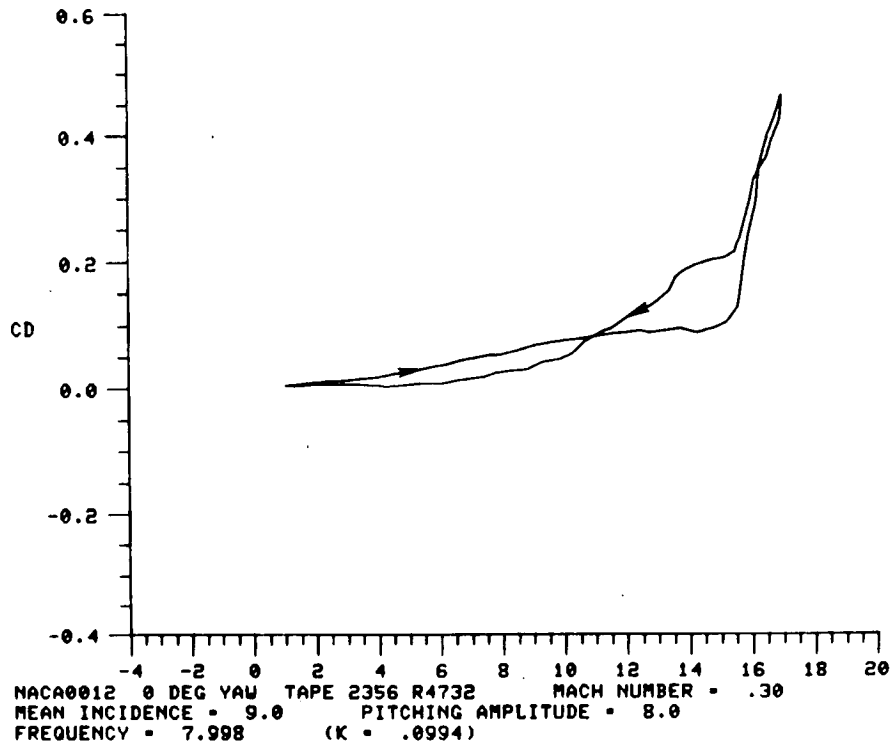
FILE 39. RUN 61.001



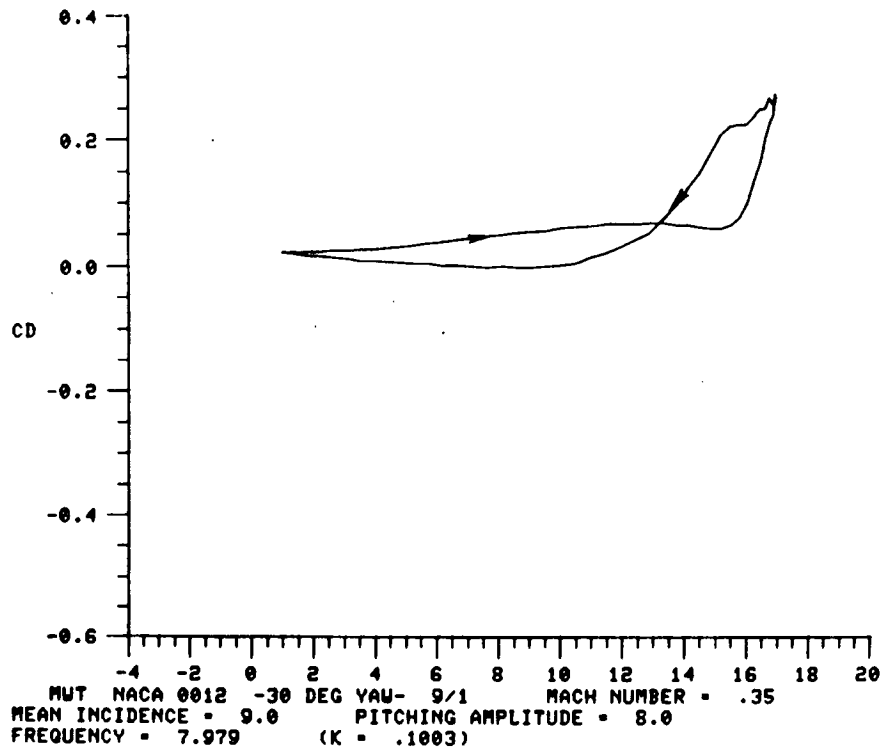
FILE 6. RUN1029.008



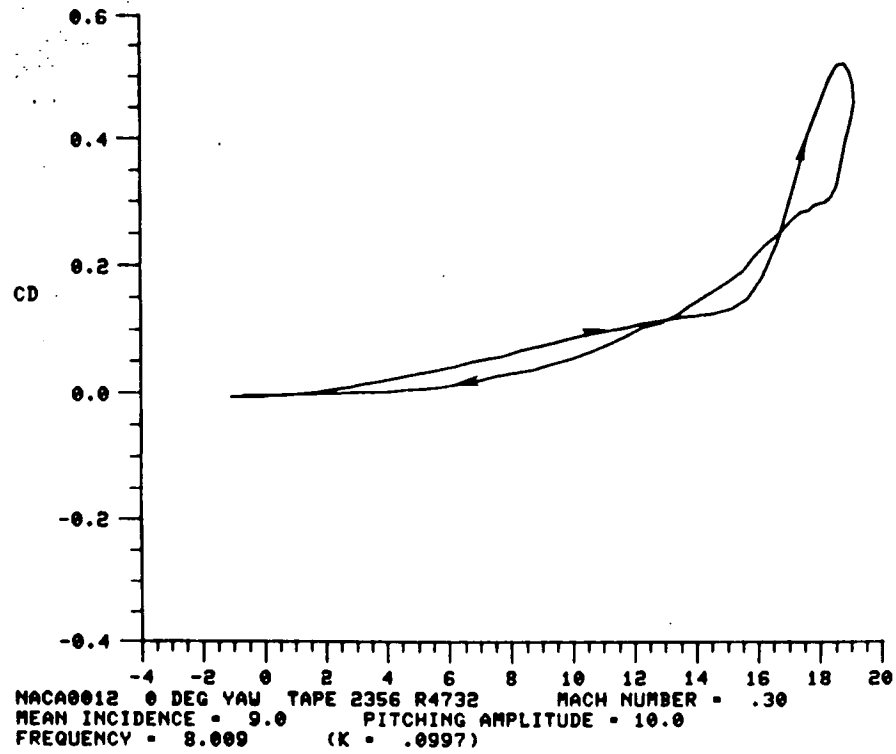
FILE 4. RUN 47.003



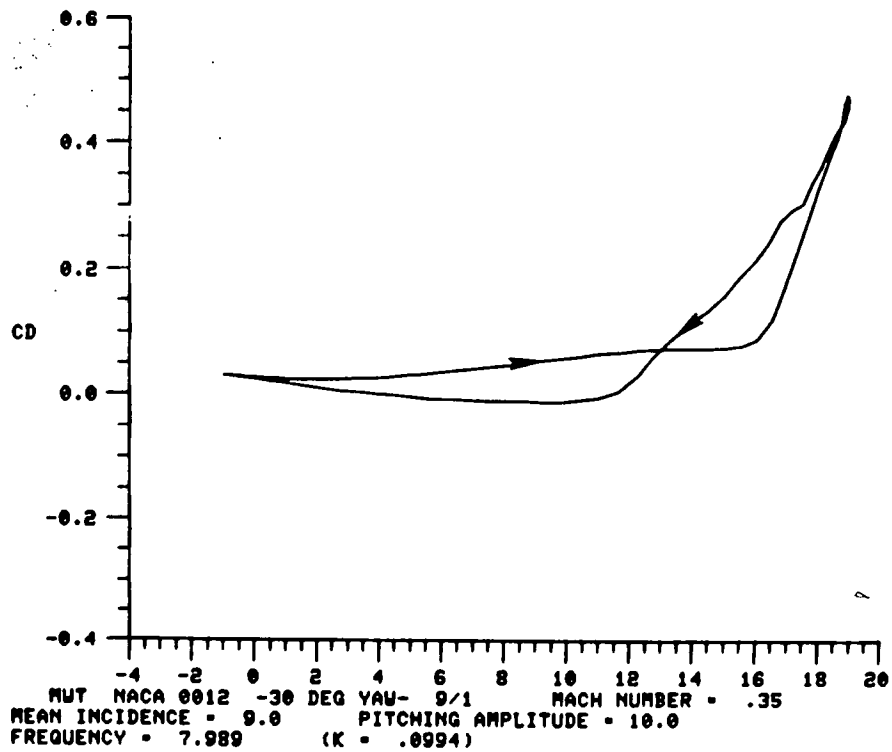
FILE 28. RUN1018.017



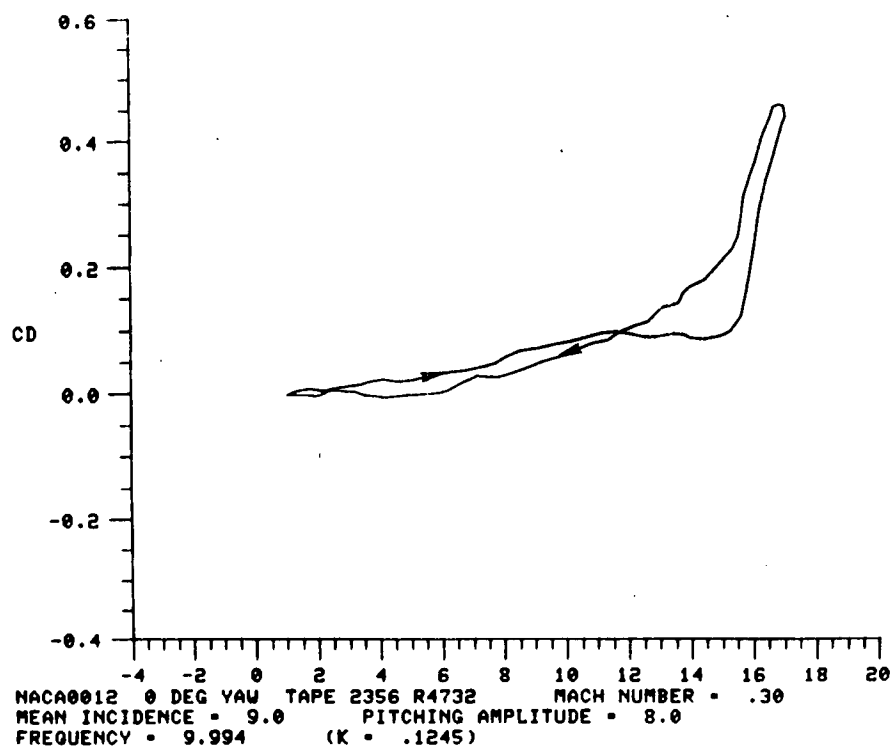
FILE 40. RUN 61.004



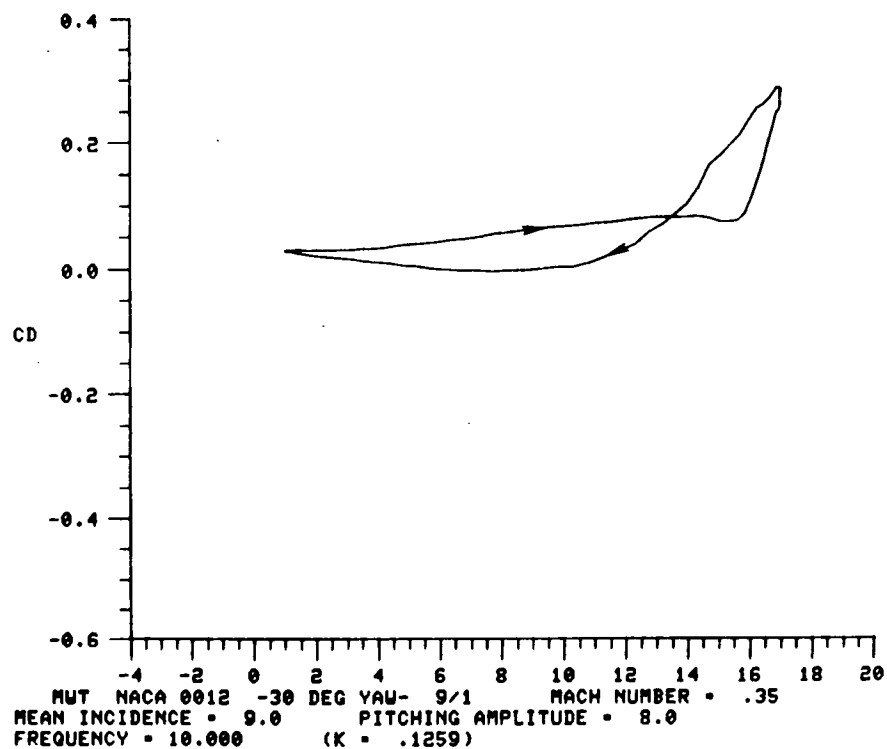
FILE 8. RUN1029.012



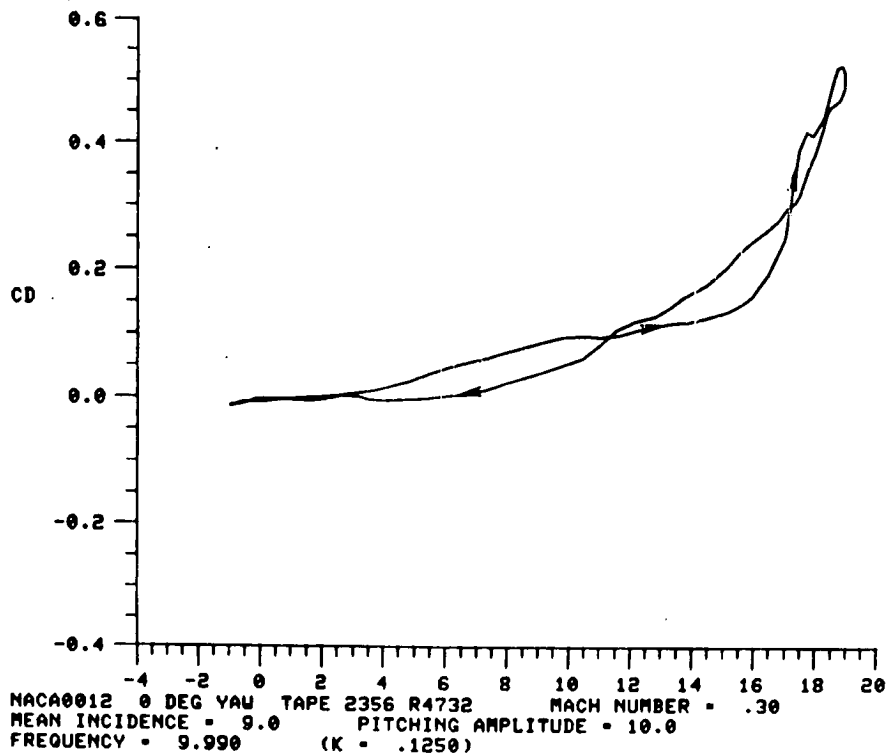
FILE 5. RUN 47.005



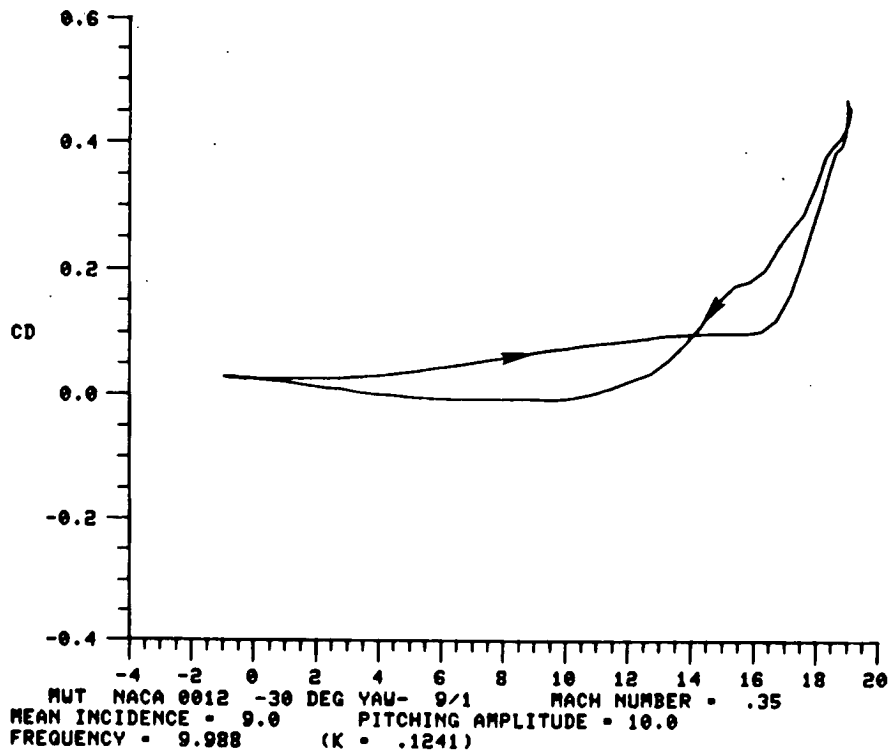
FILE 29. RUN1018.019



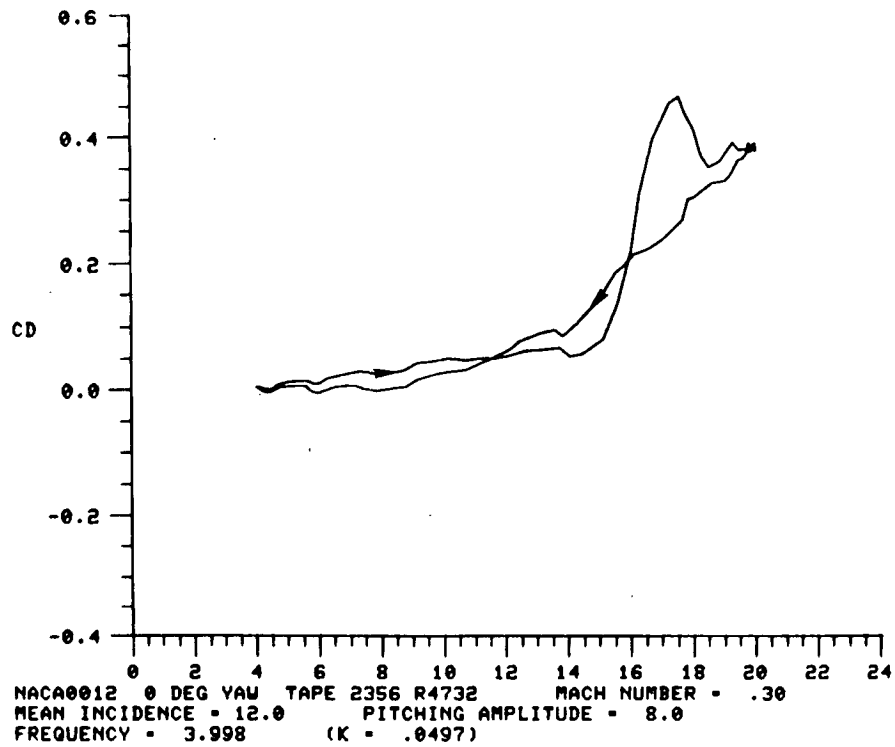
FILE 41. RUN 61.006



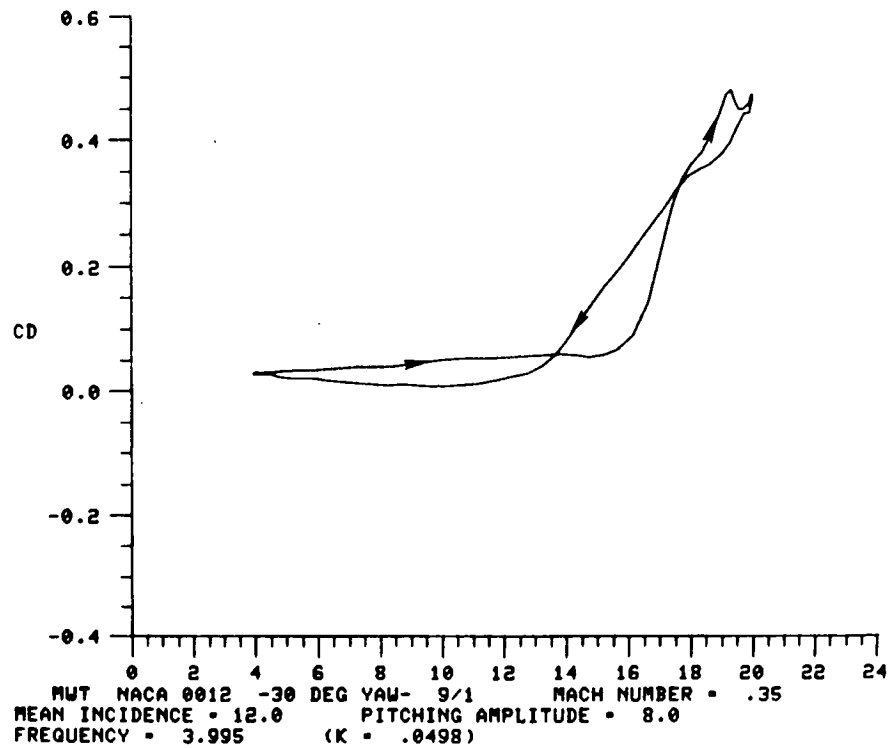
FILE 9. RUN1029.014



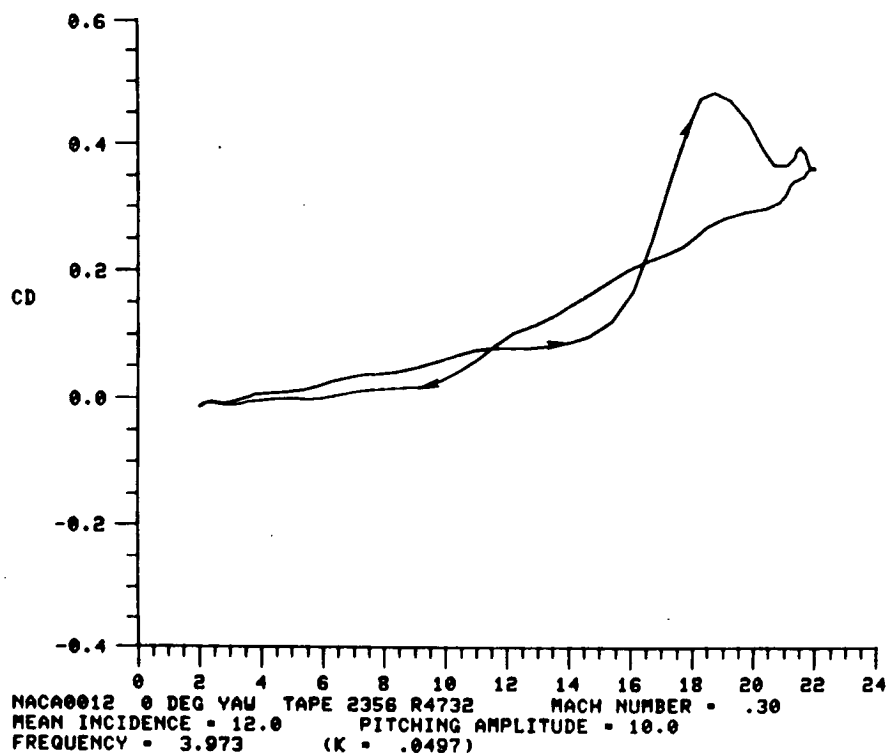
FILE 15. RUN 51.001



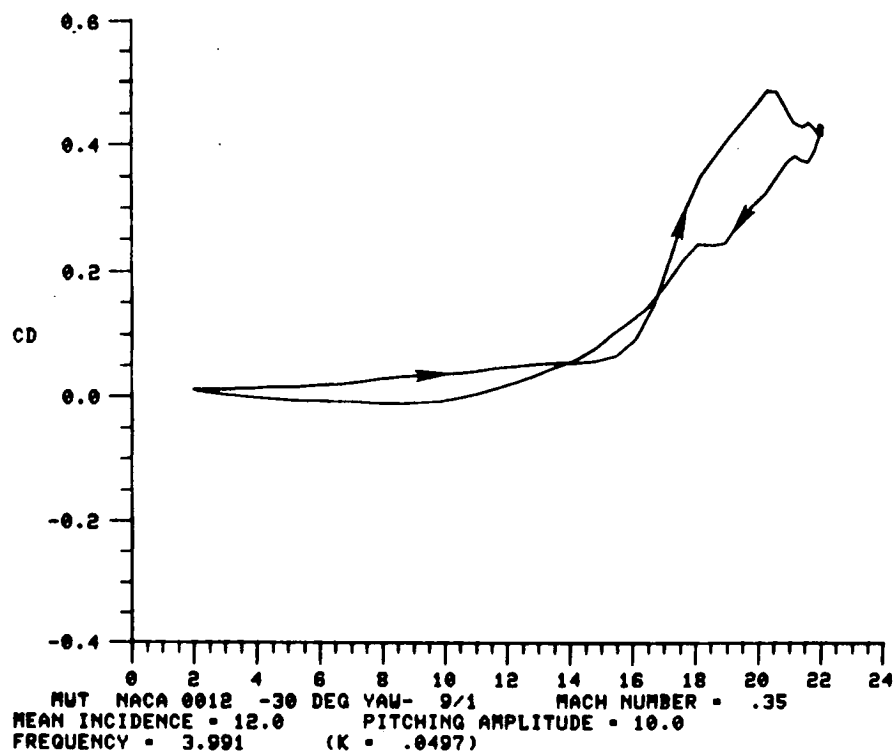
FILE 53. RUN1016.004



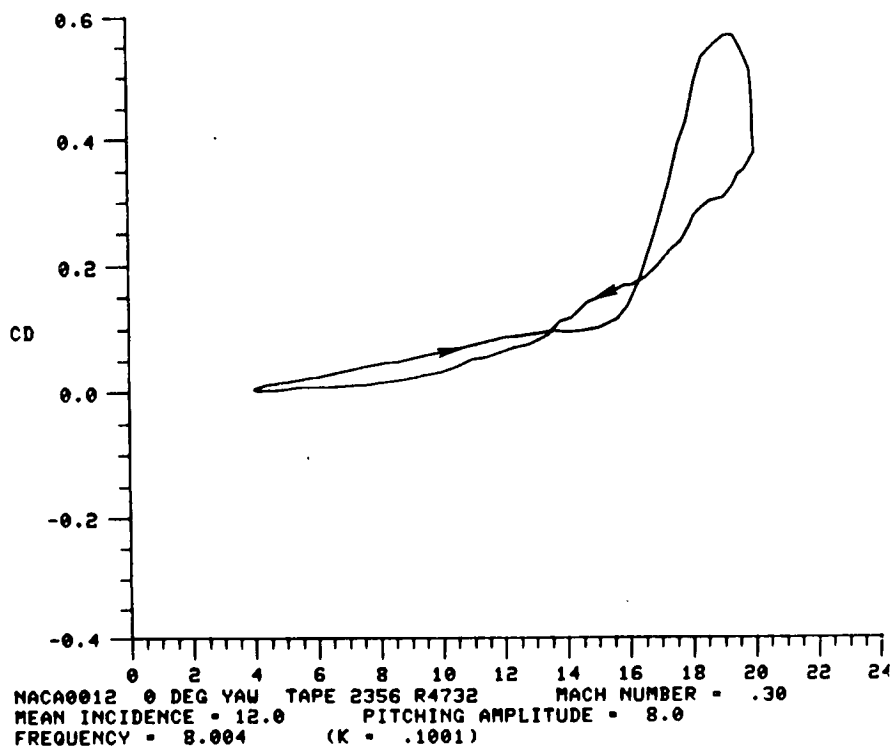
FILE 33. RUN 59.001



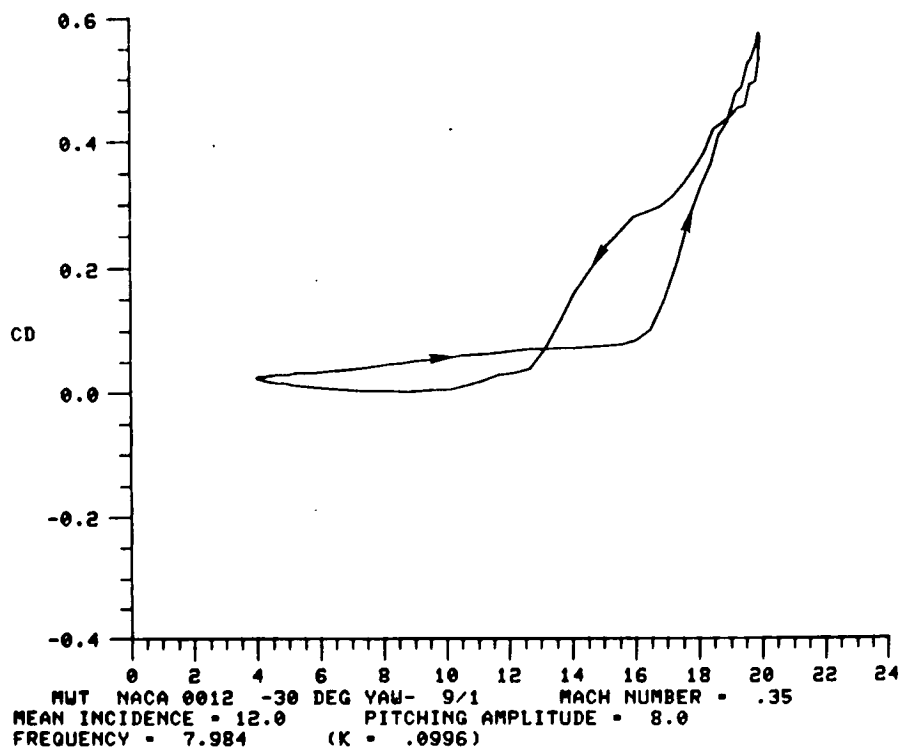
FILE 39. RUN1033.008



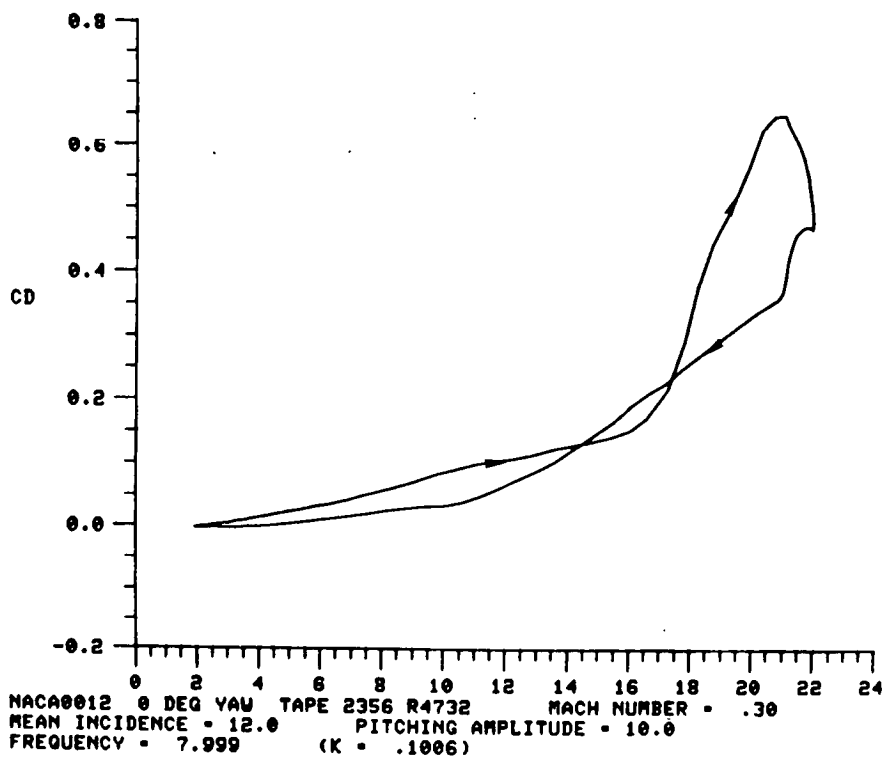
FILE 16. RUN 51.003



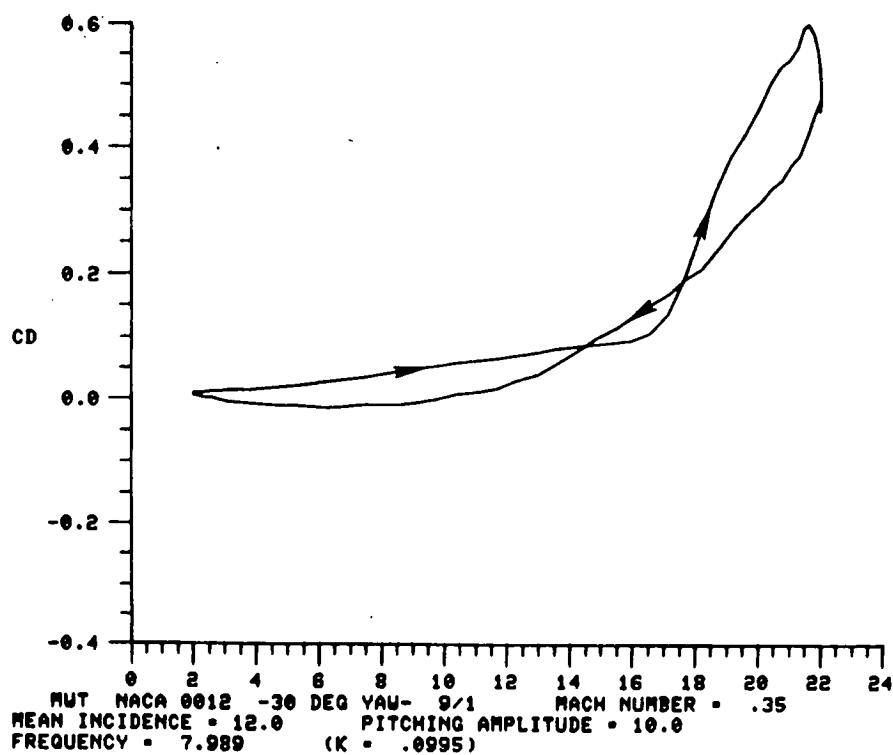
FILE 19. RUN1016.010



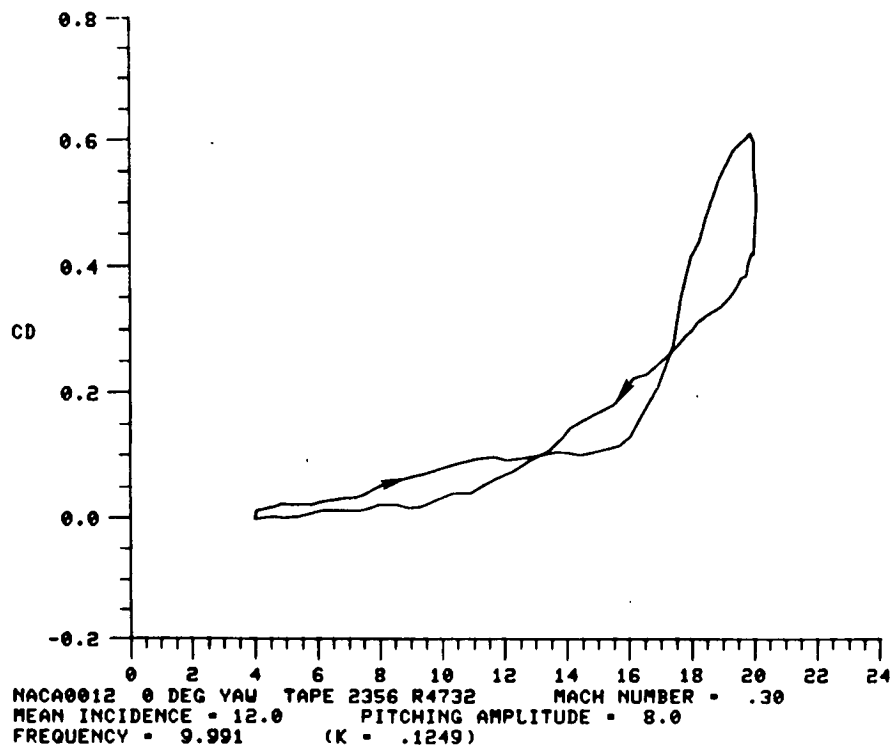
FILE 34. RUN 59.004



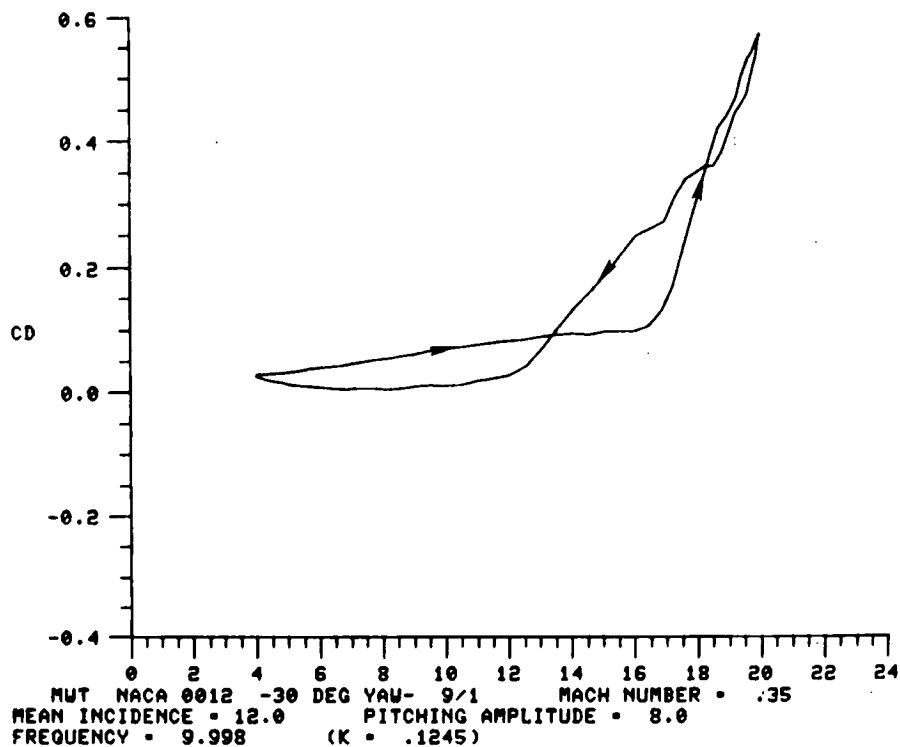
FILE 41. RUN1033.012



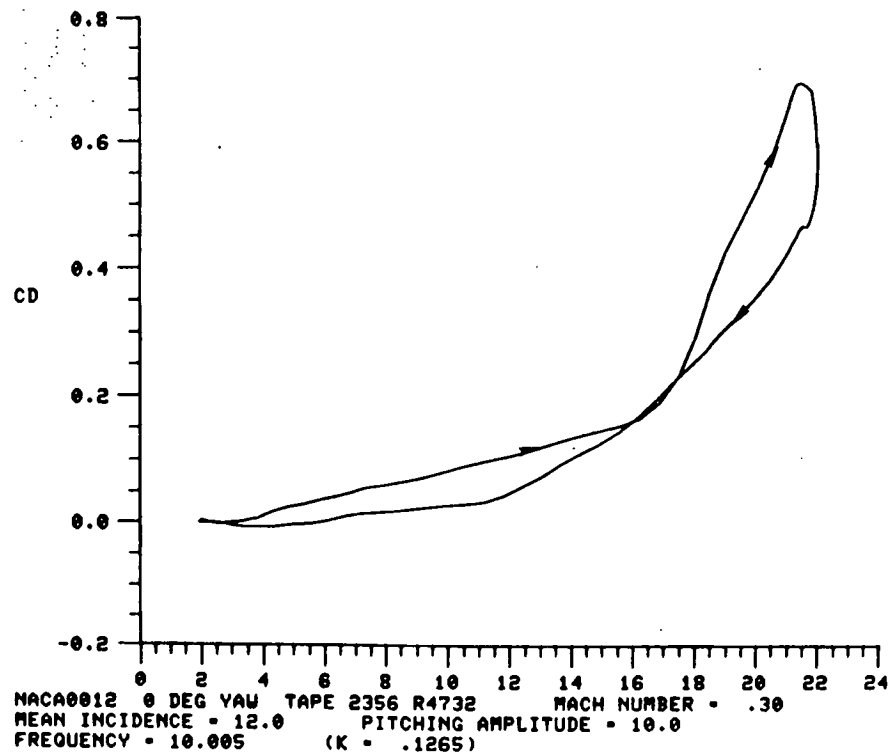
FILE 17. RUN 51.005



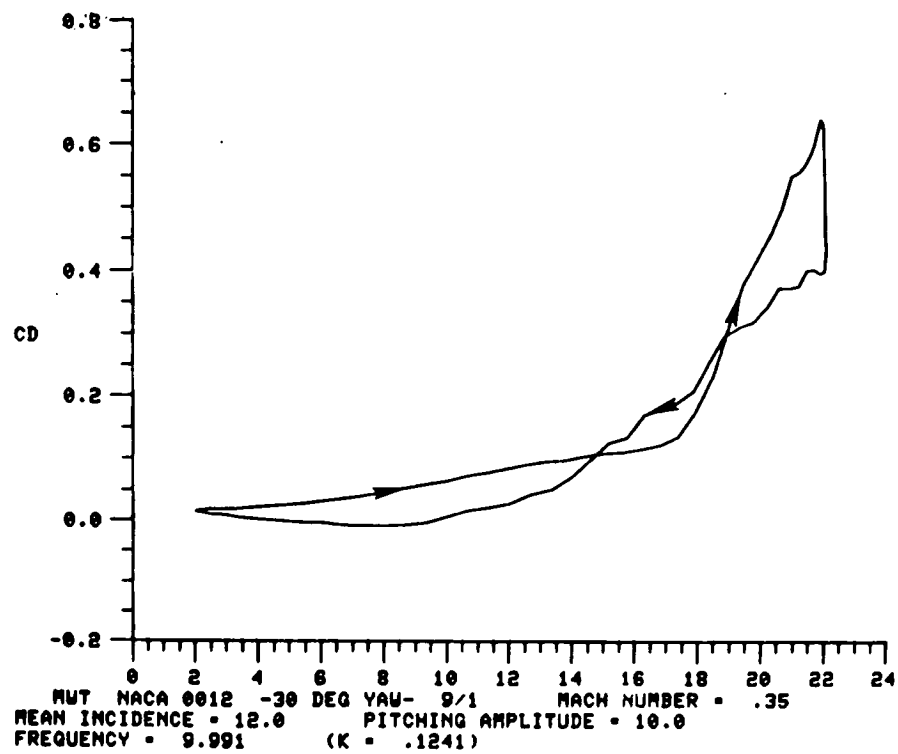
FILE 20. RUN3016.012



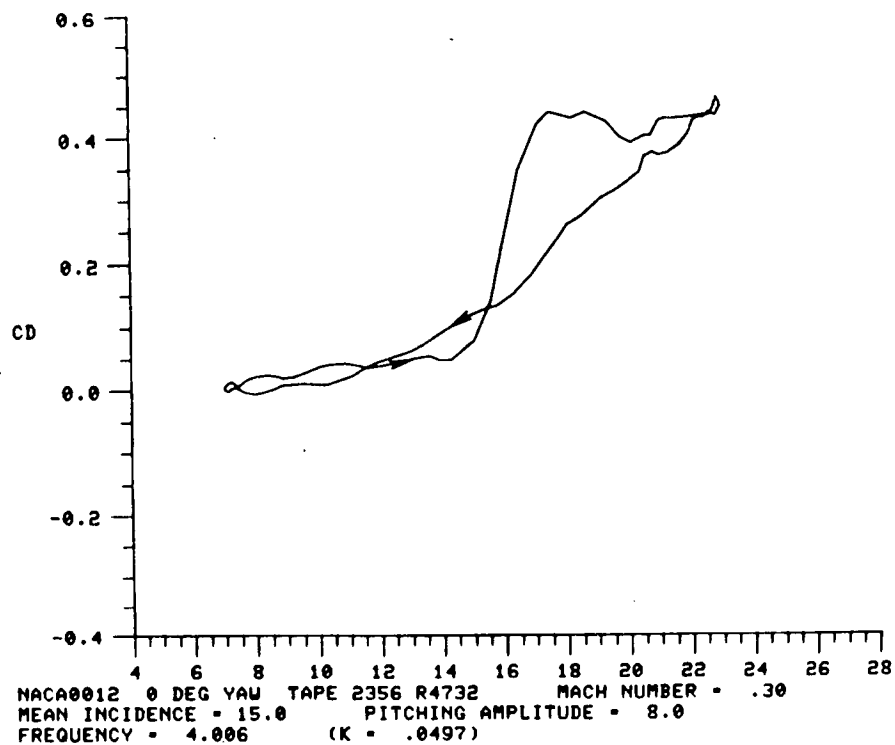
FILE 35. RUN 59.007



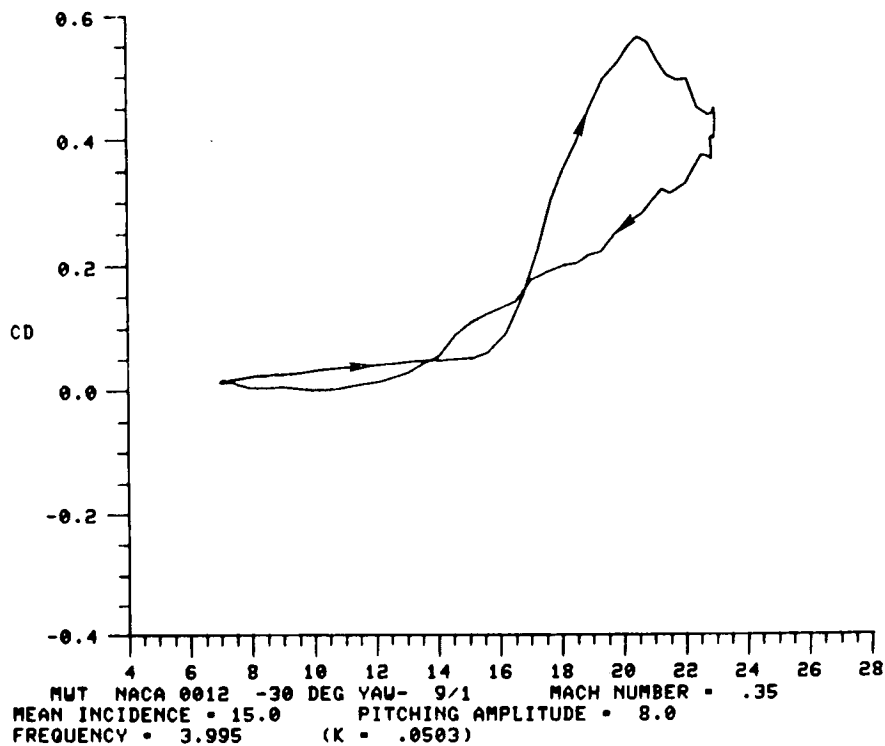
FILE 42. RUN1033.014



FILE 9. RUN 49.001

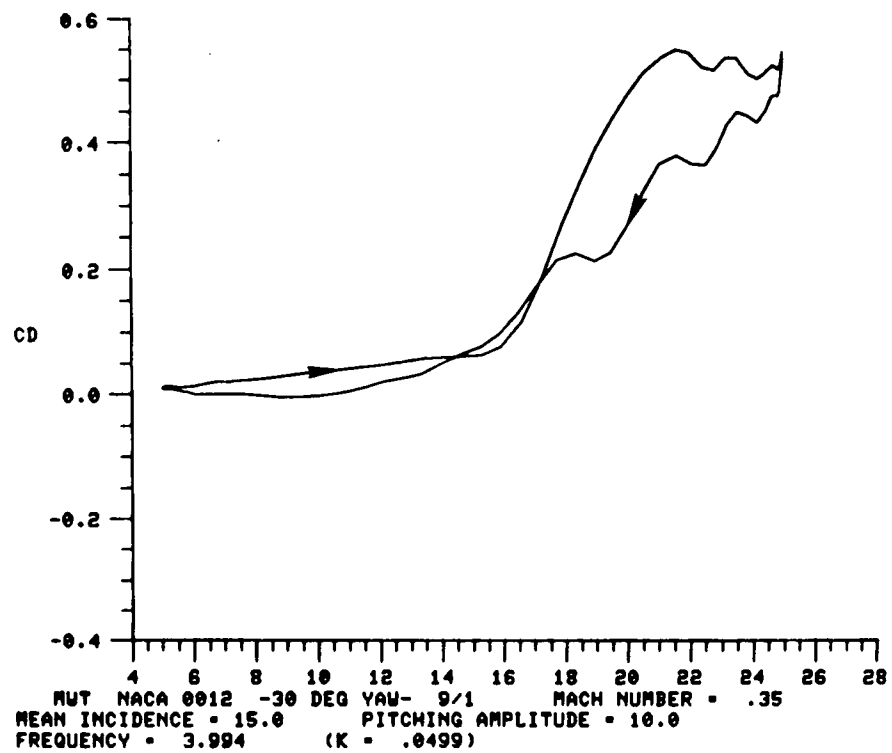


FILE 35. RUN1020.008

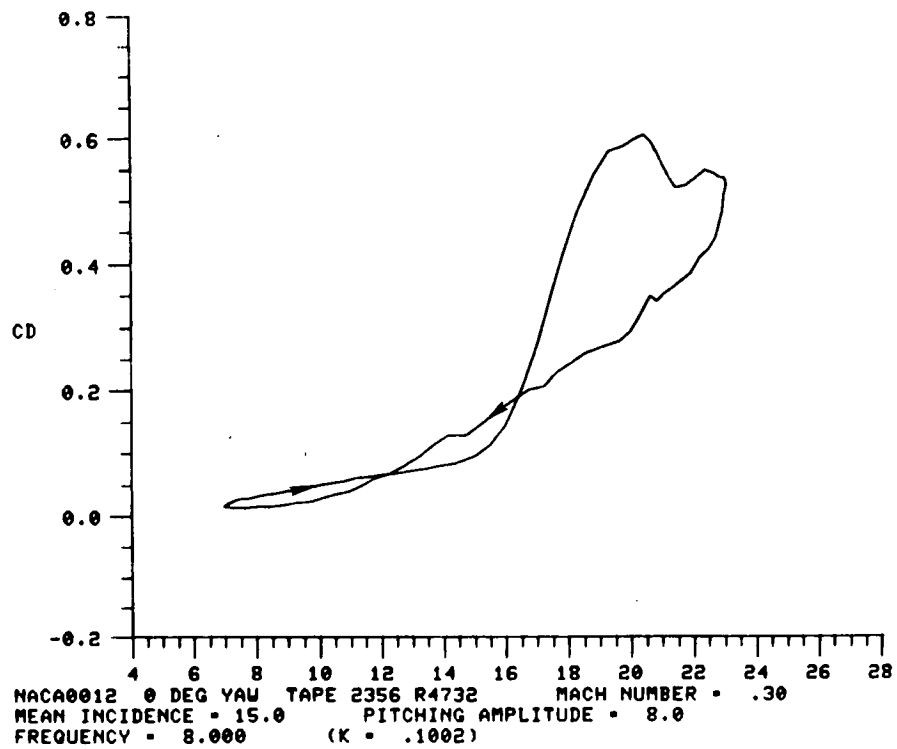


DATA WERE NOT OBTAINED

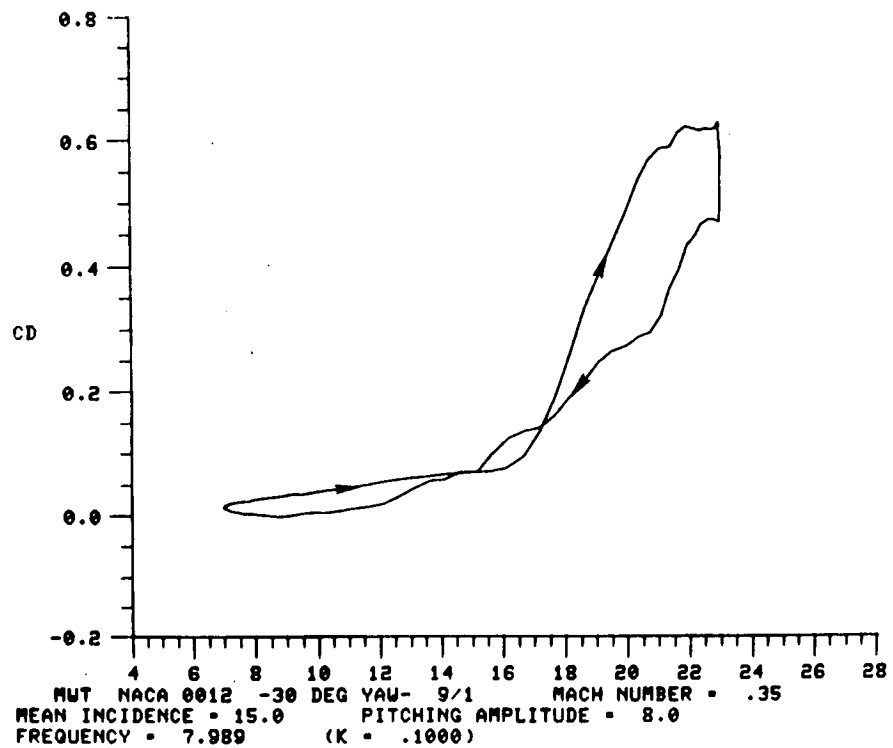
FILE 53. RUN1036.001



FILE 10. RUN 49.003

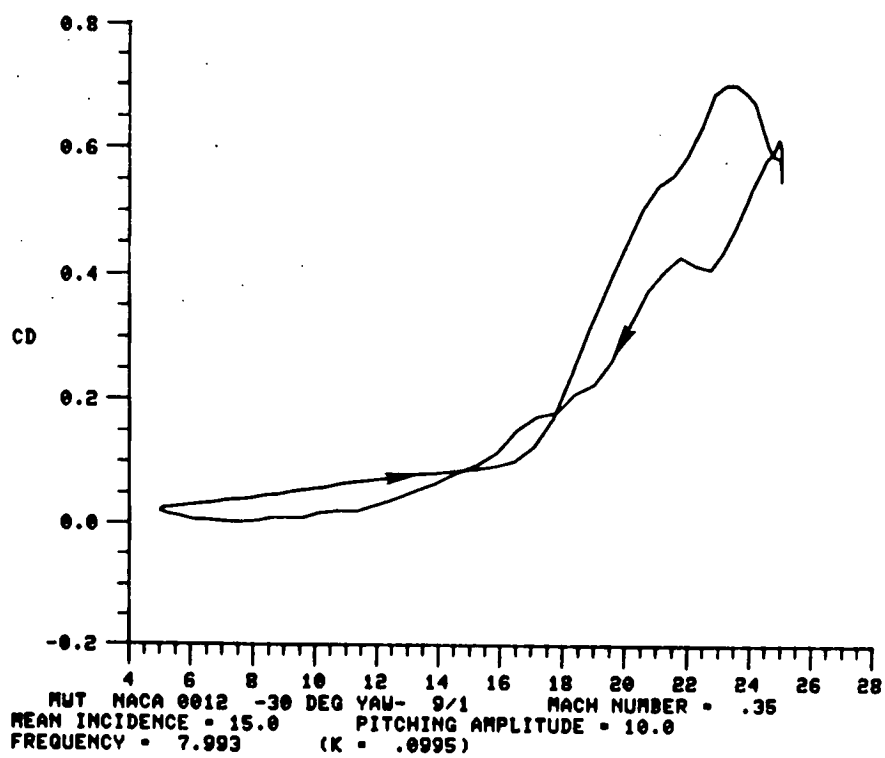


FILE 37. RUN1020.012

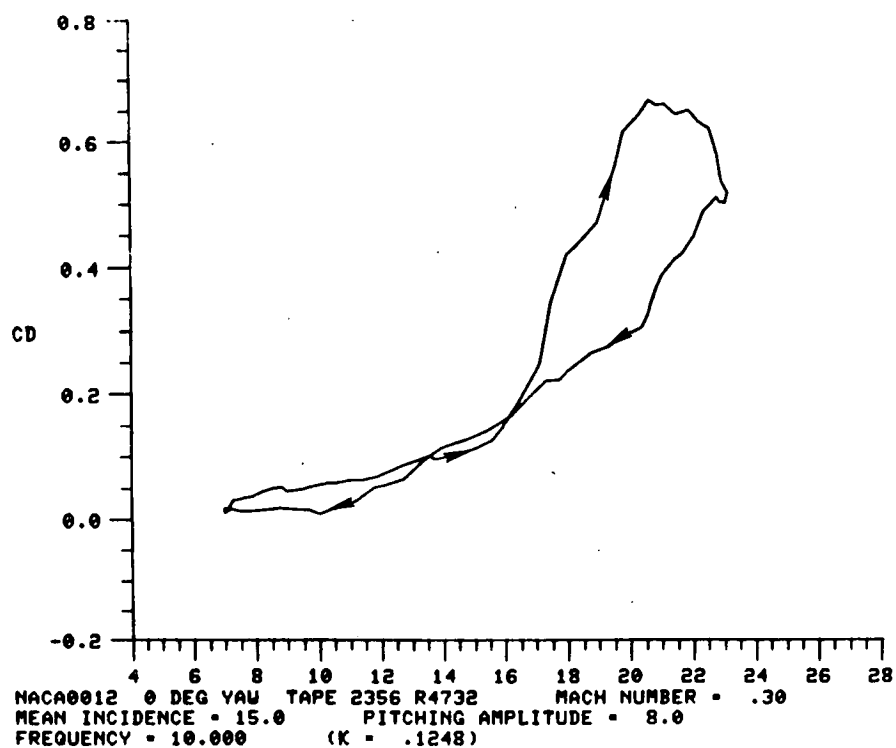


DATA WERE NOT OBTAINED

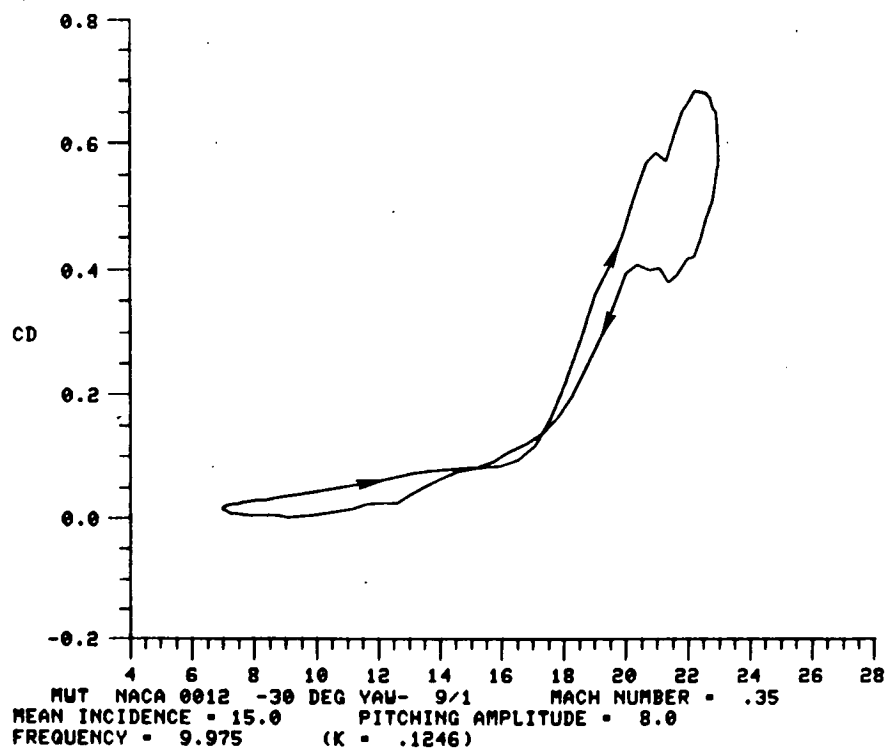
FILE 55. RUN1036.005



FILE 11. RUN 49.005

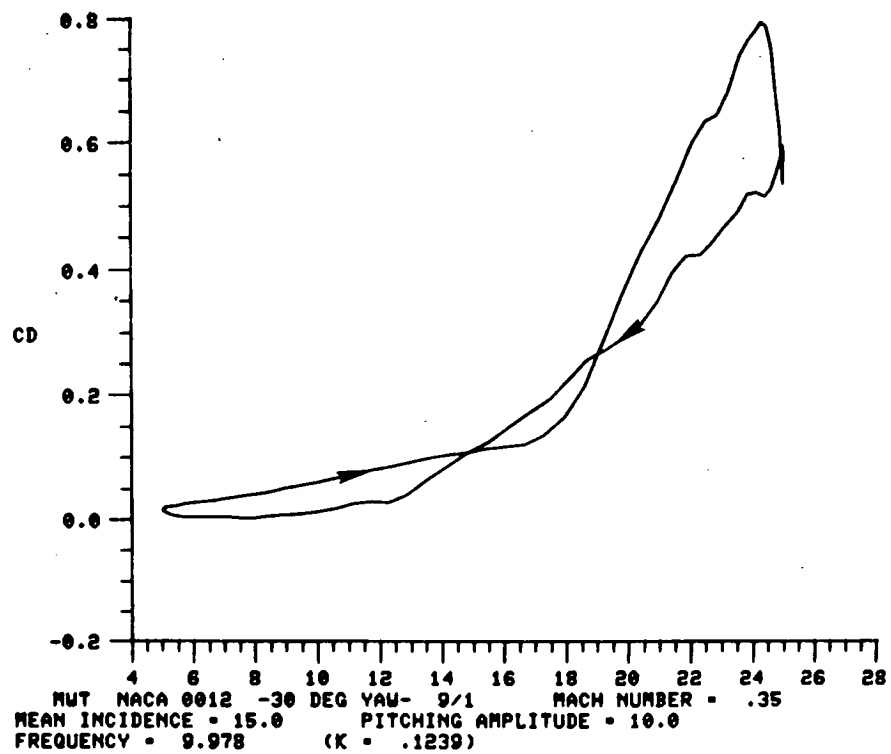


FILE 38. RUN1020.014

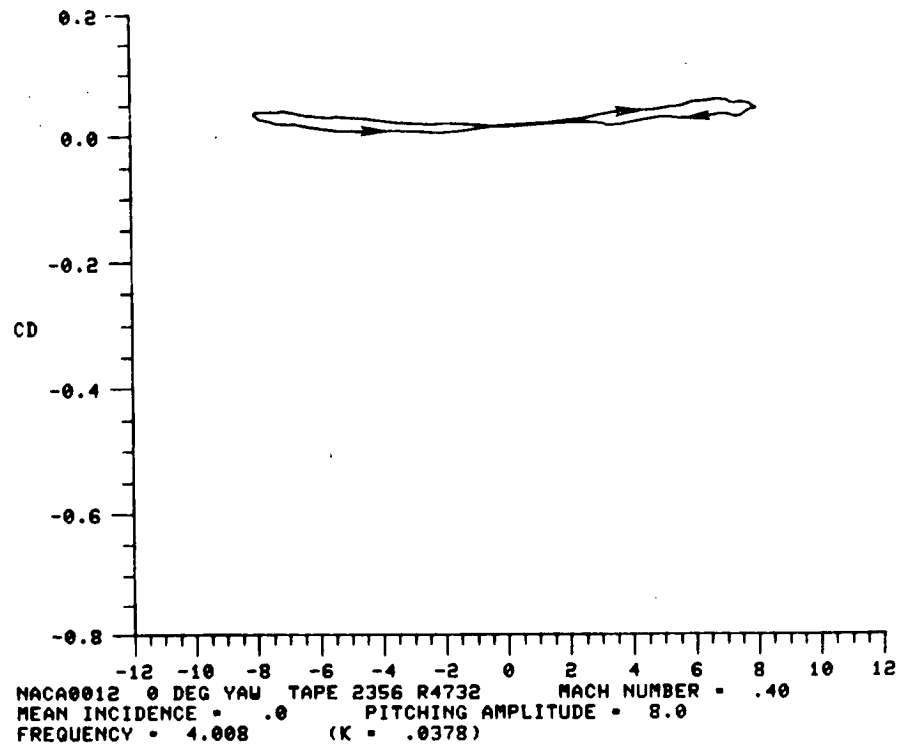


DATA WERE NOT OBTAINED

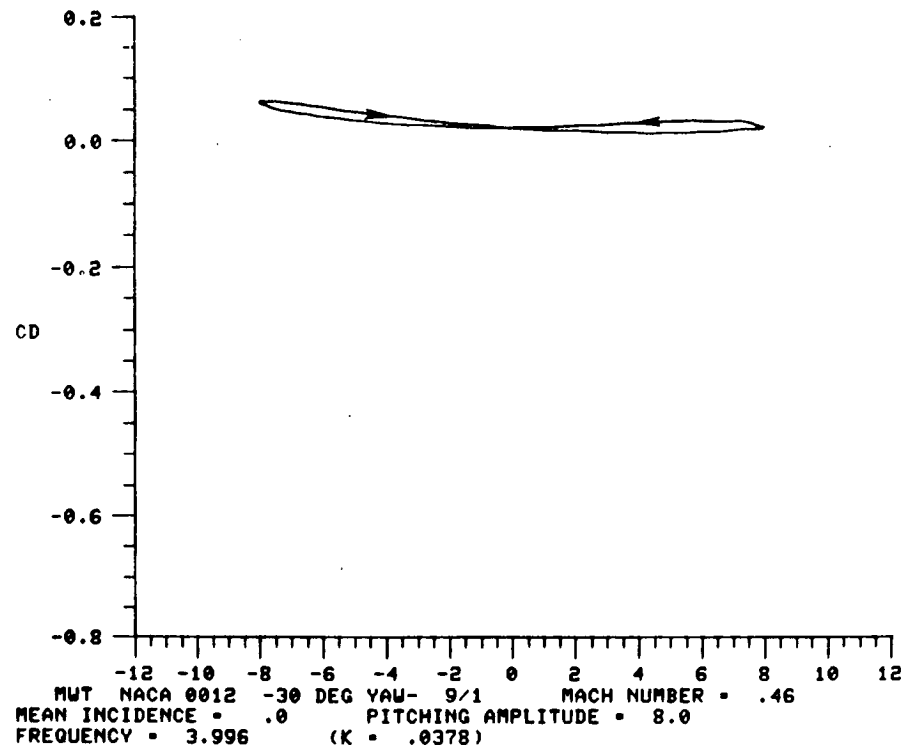
FILE 56. RUN1036.007

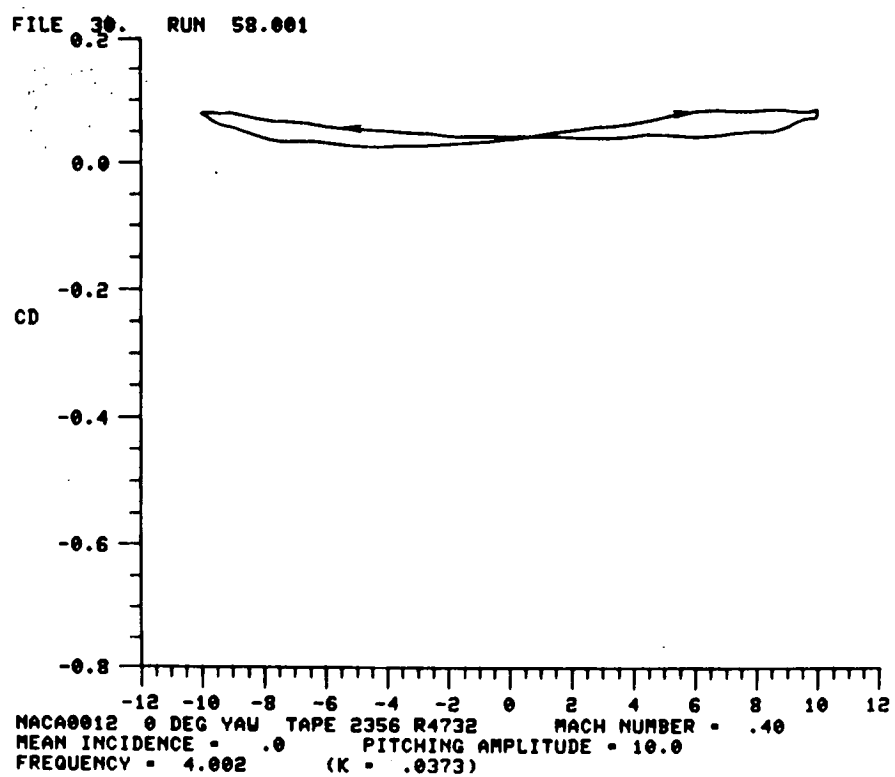


FILE 24. RUN 54.001



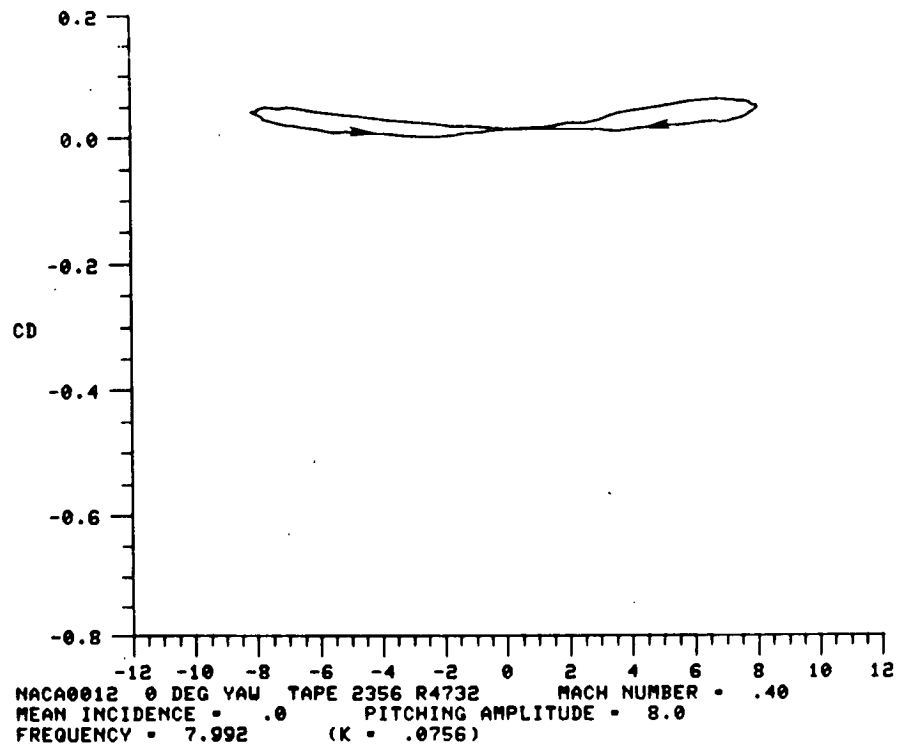
FILE 12. RUN1008.001



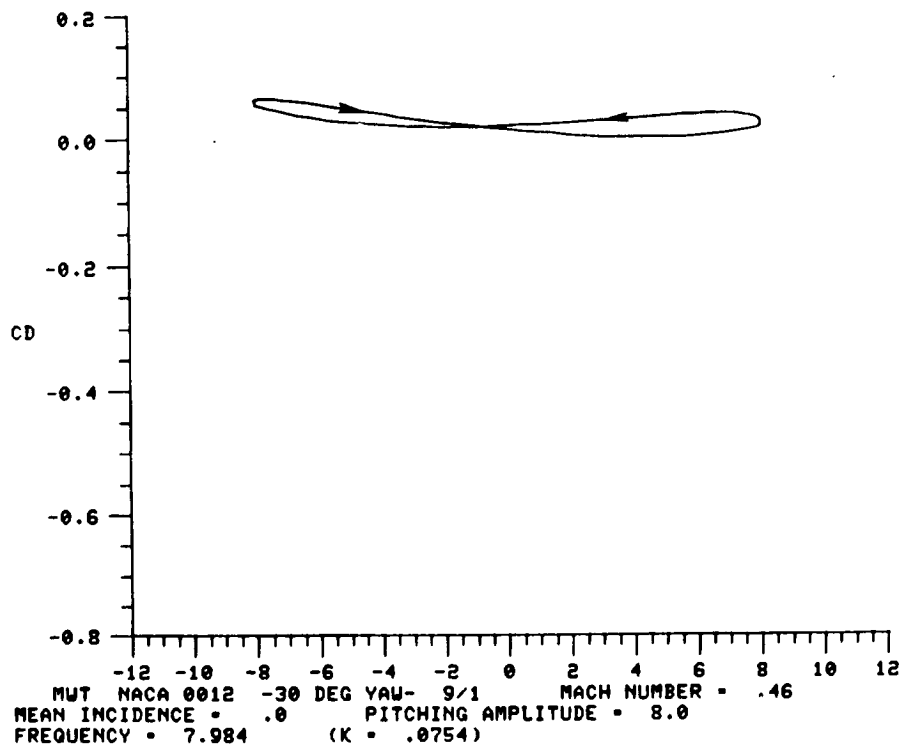


DATA WERE NOT OBTAINED

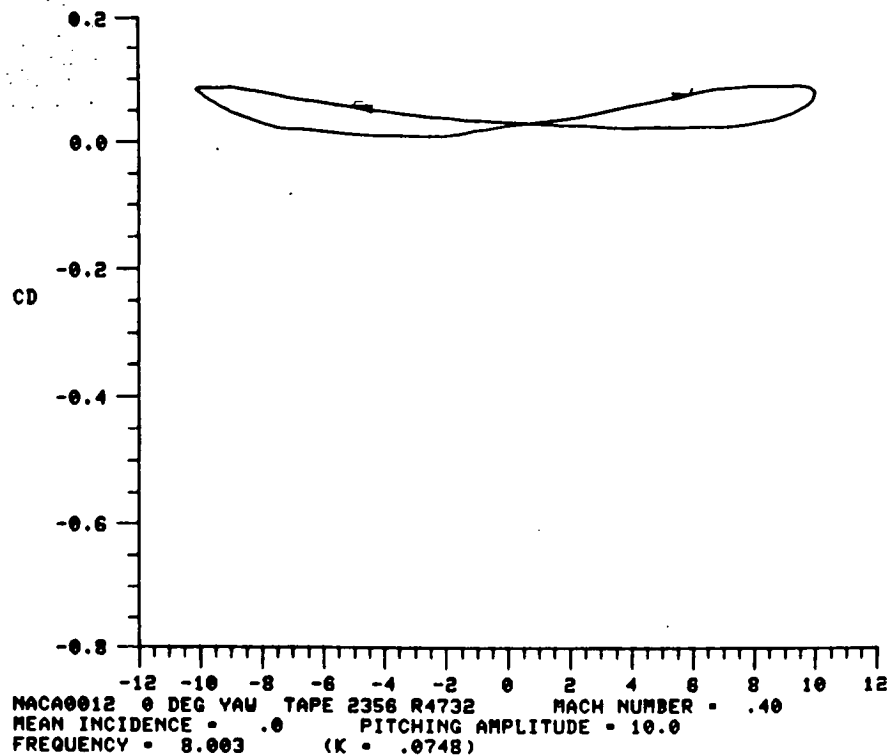
FILE 25. RUN 54.003



FILE 14. RUN1008.005

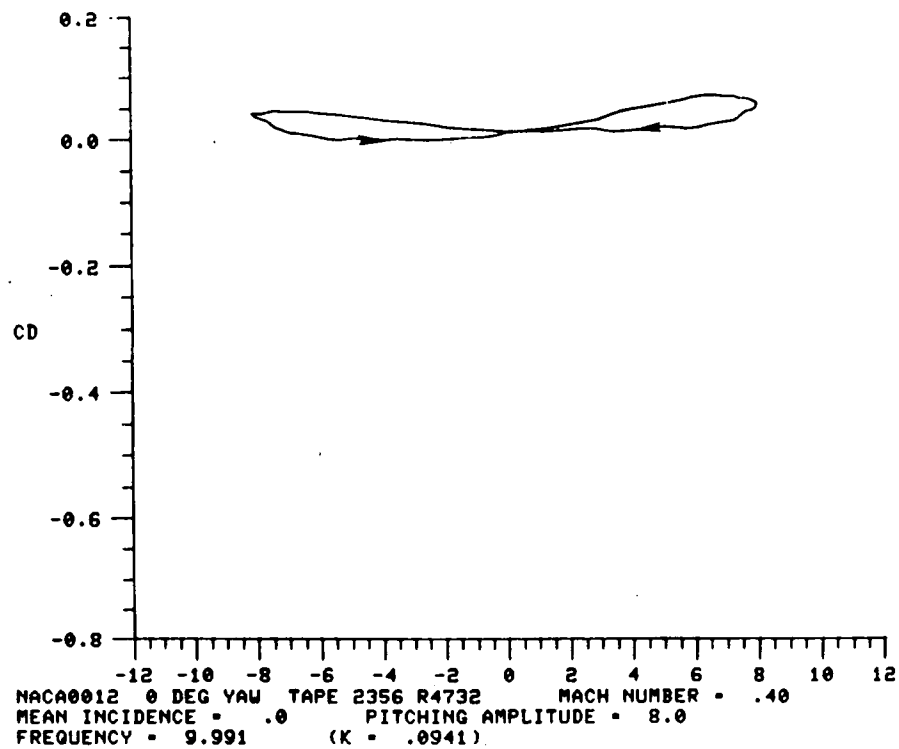


FILE 31. RUN 58.003

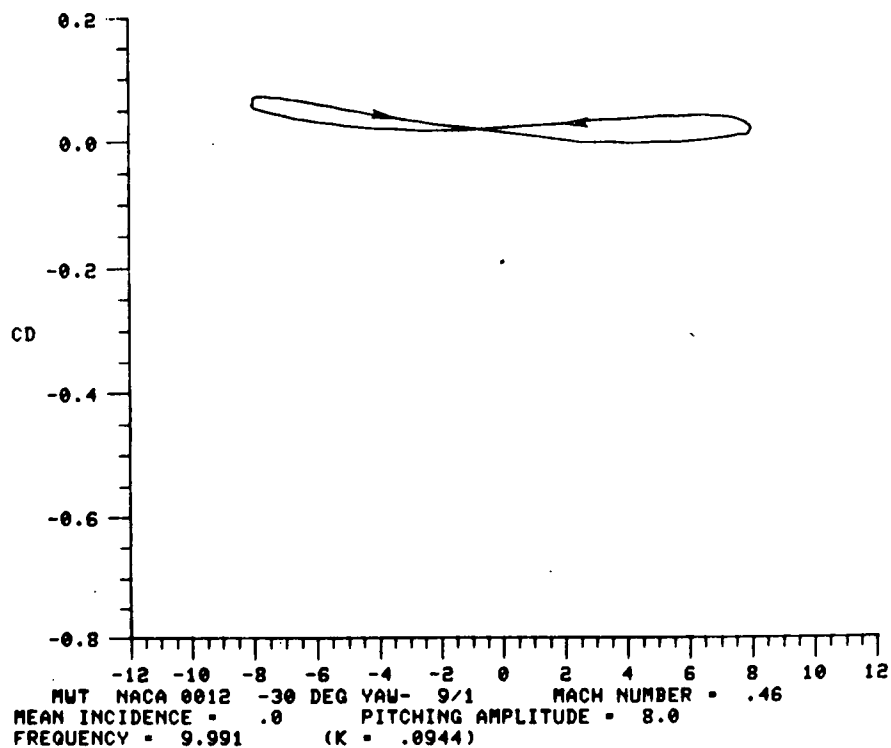


DATA WERE NOT OBTAINED

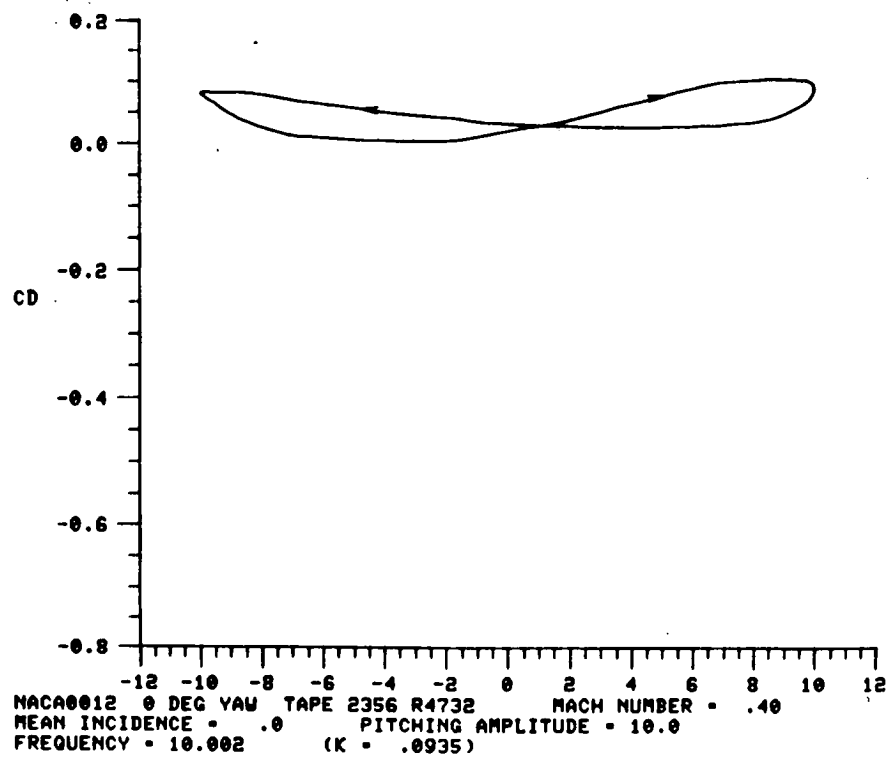
FILE 26. RUN 54.005



FILE 48. RUN1008.007

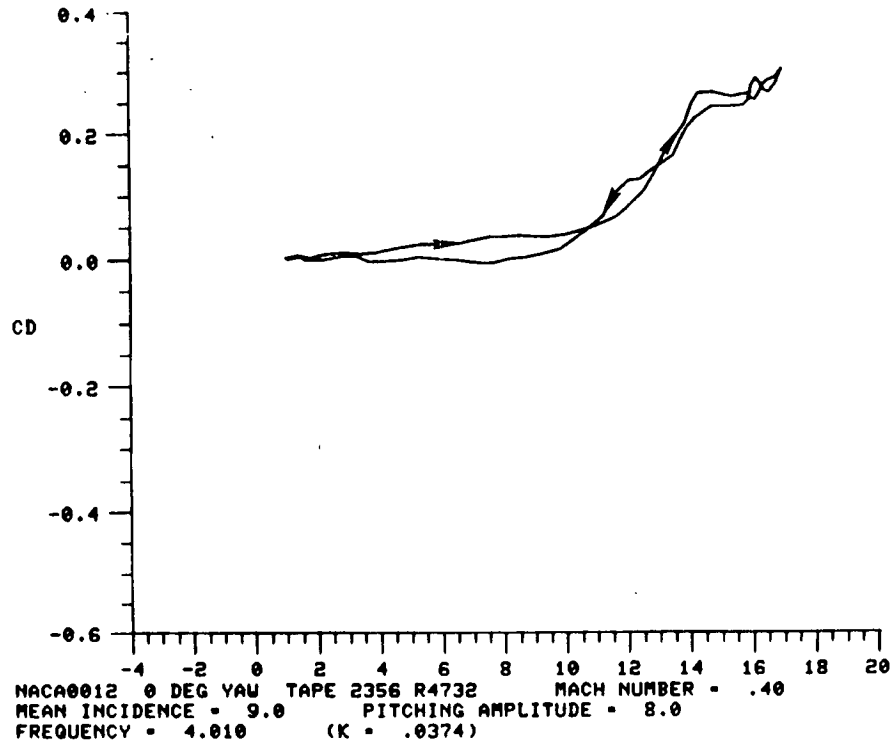


FILE 32. RUN 58.005

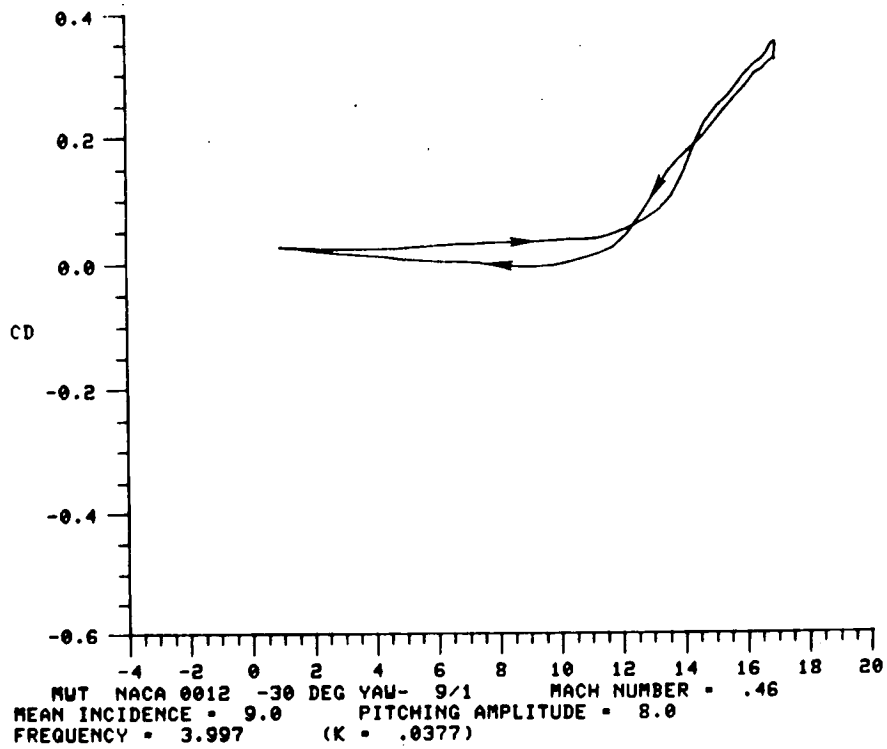


DATA WERE NOT OBTAINED

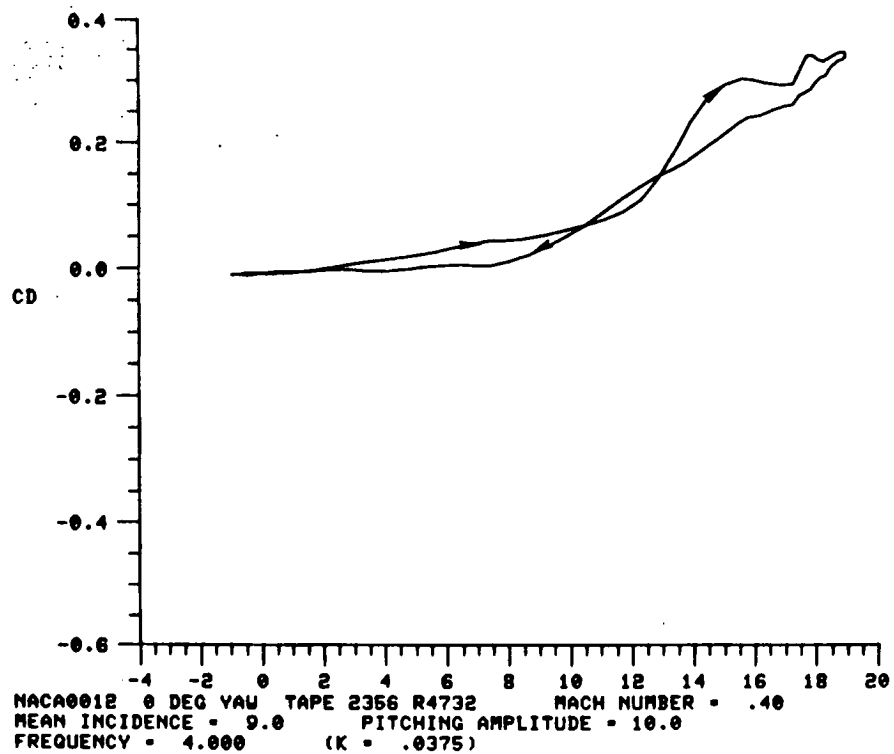
FILE 6. RUN 48.001



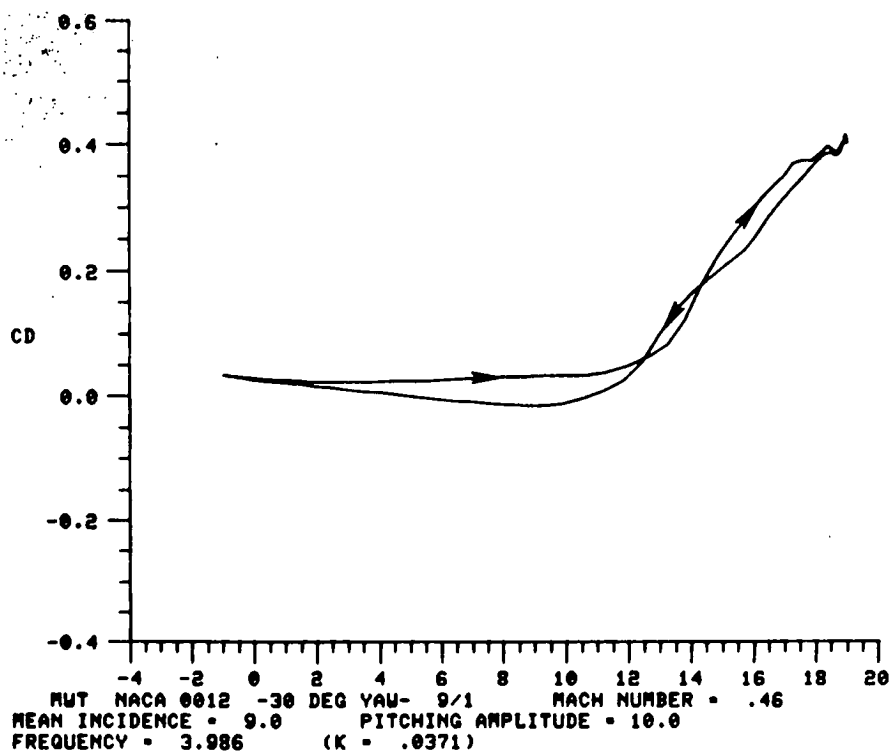
FILE 30. RUN1019.001



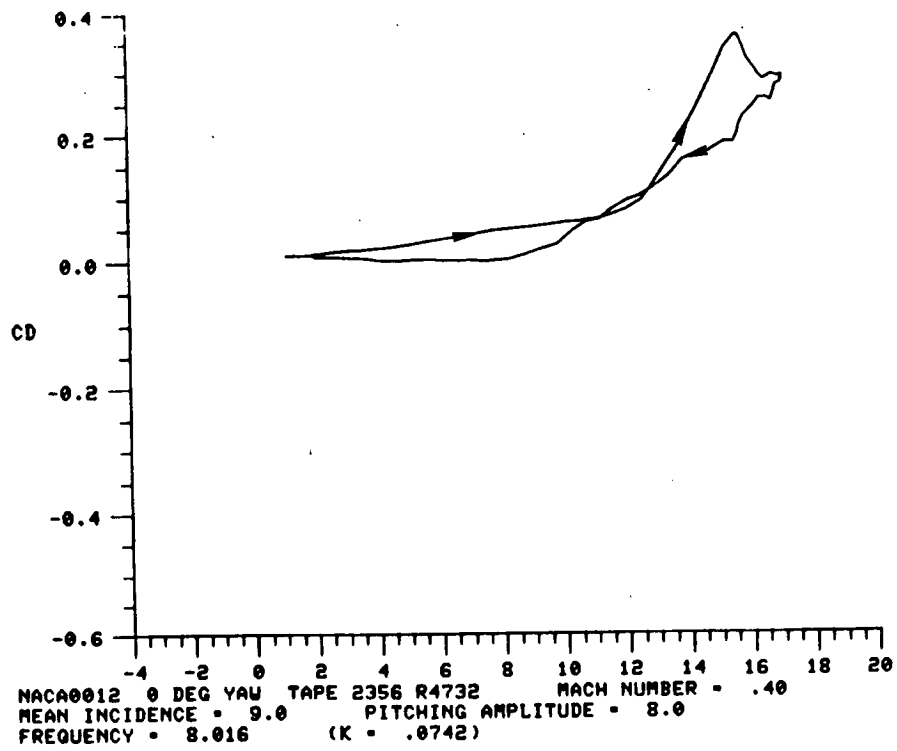
FILE 42. RUN 62.002



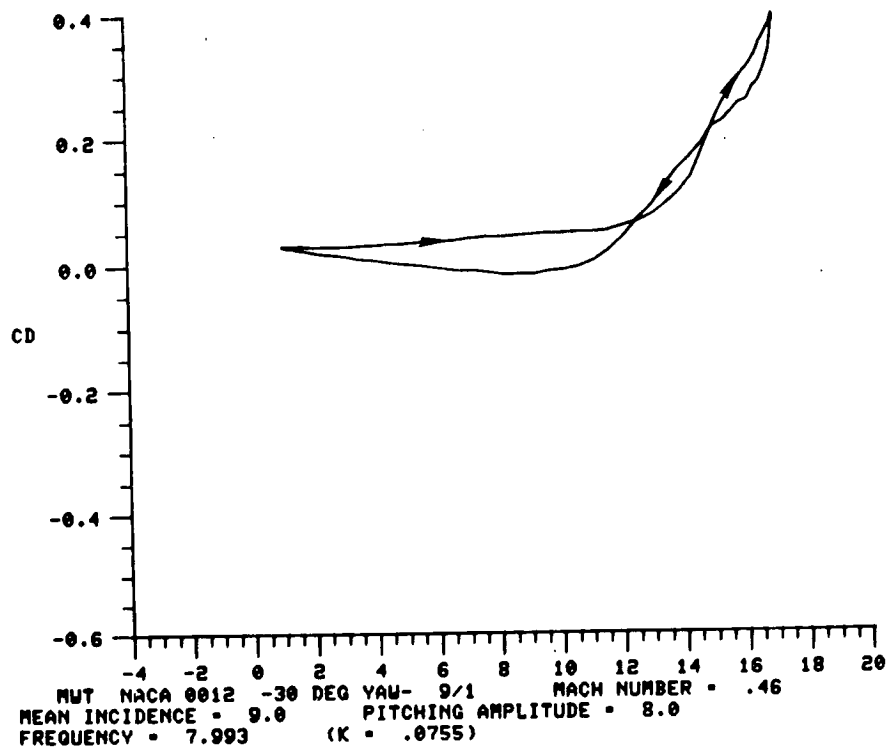
FILE 10. RUN3030.001



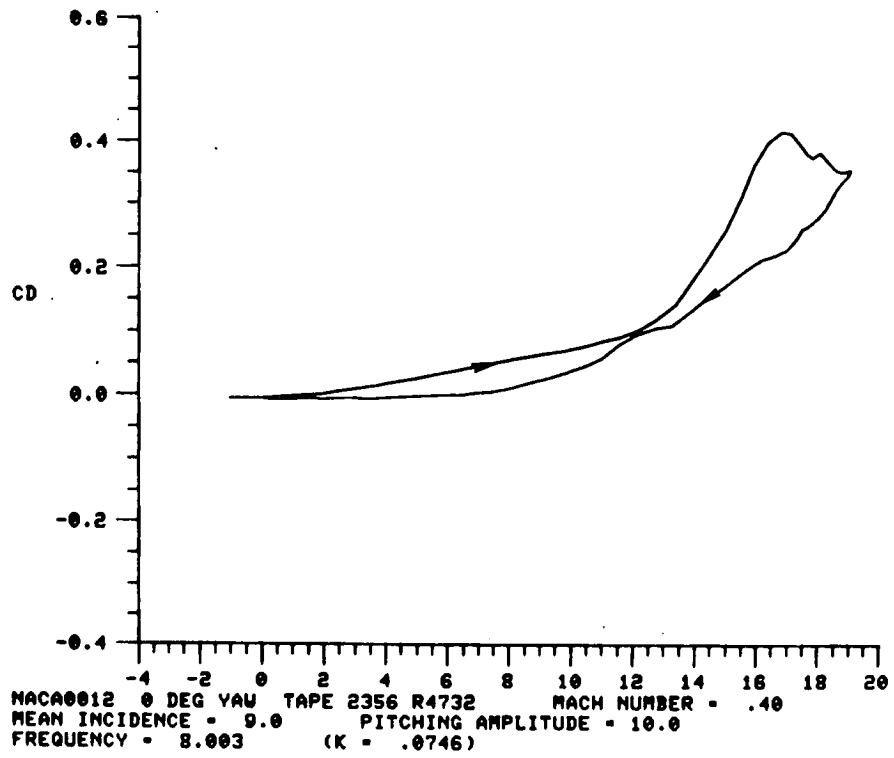
FILE 7. RUN 48.003



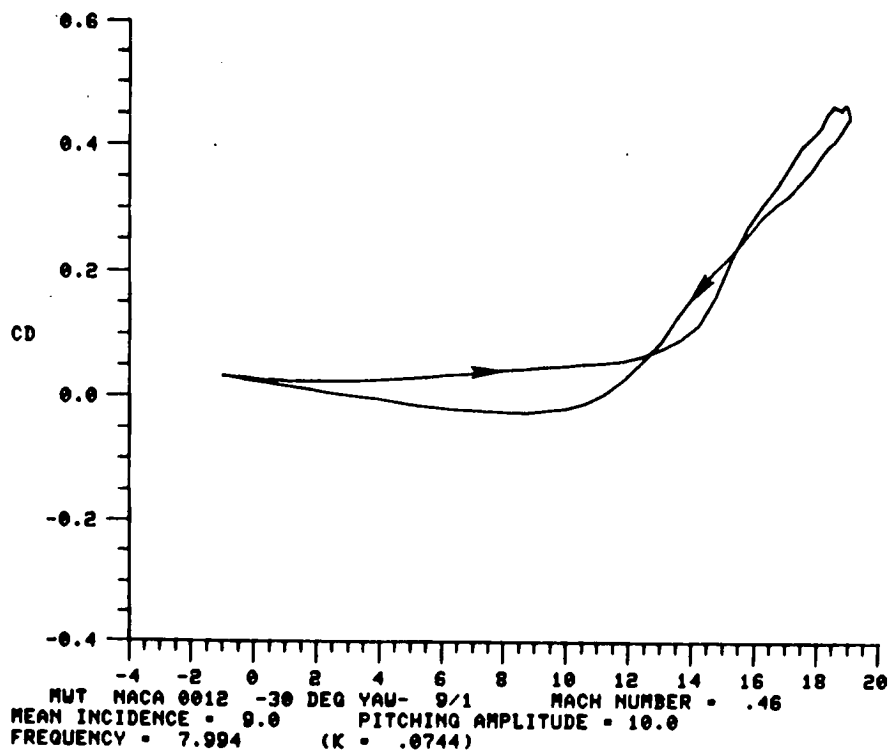
FILE 32. RUN1019.005



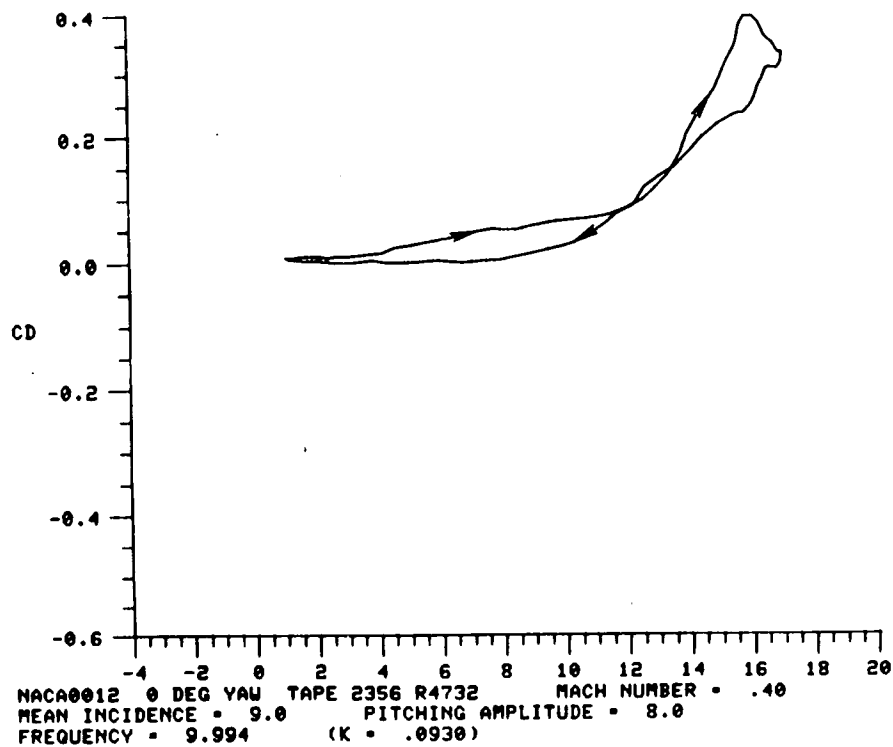
FILE 43. RUN 62.004



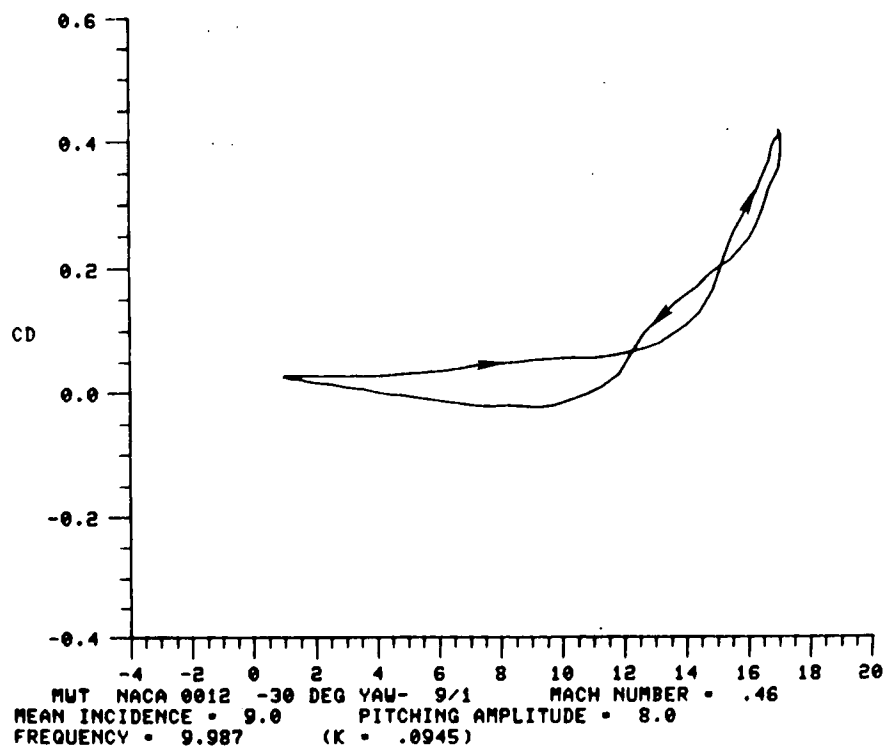
FILE 12. RUN1030.005



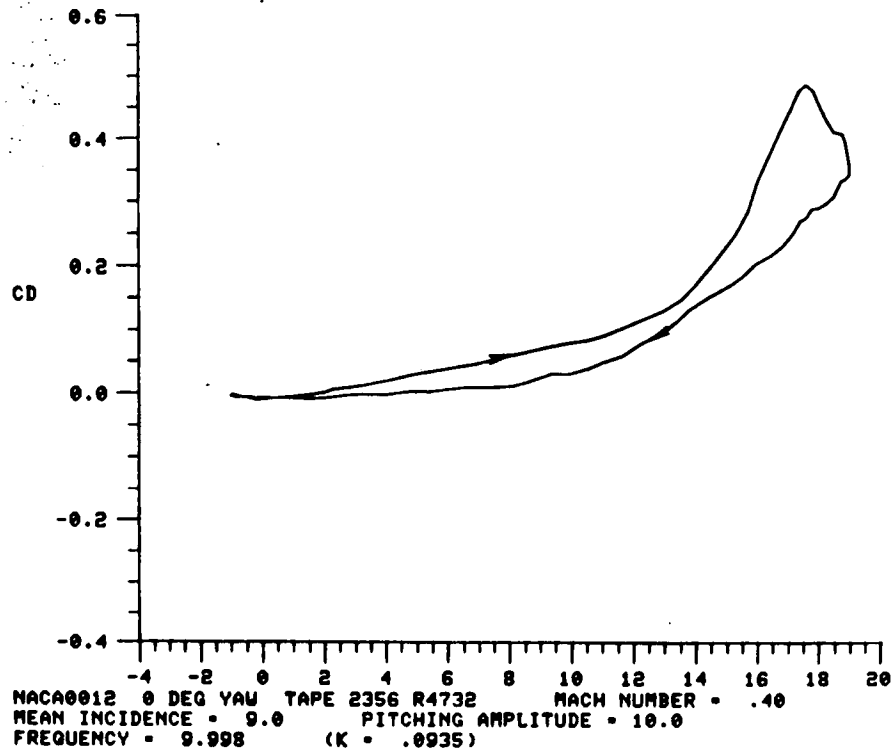
FILE 8. RUN 48.005



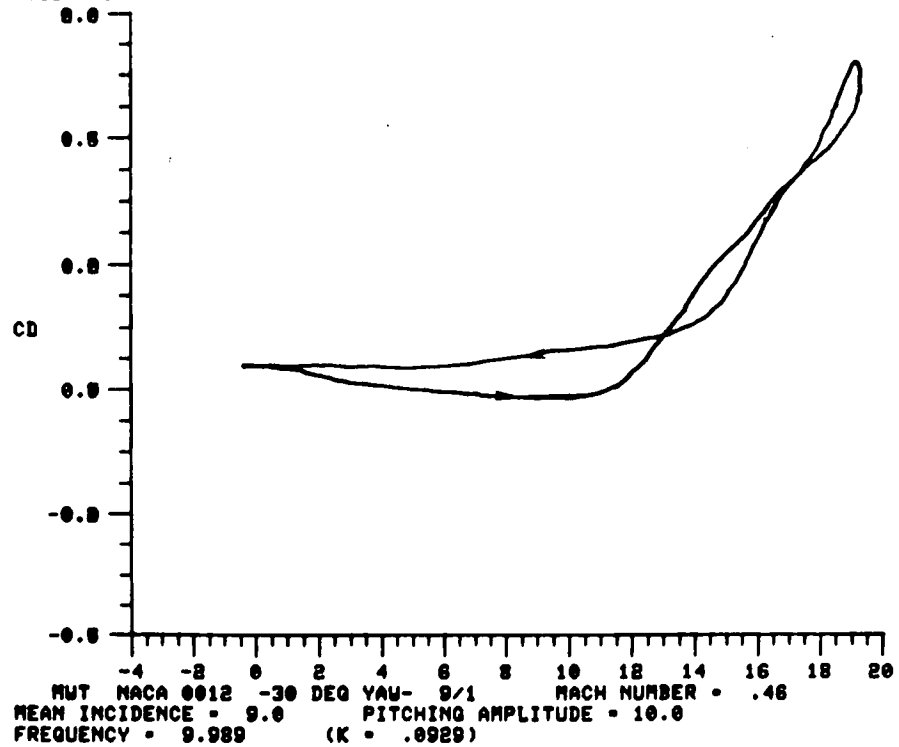
FILE 33. RUN1019.007



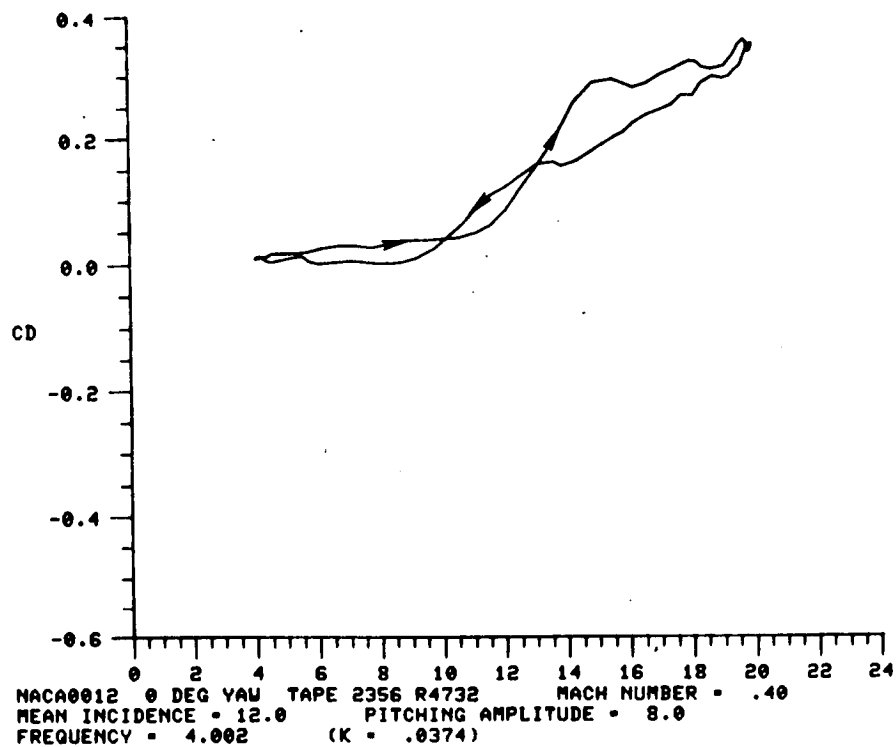
FILE 44. RUN 62.006



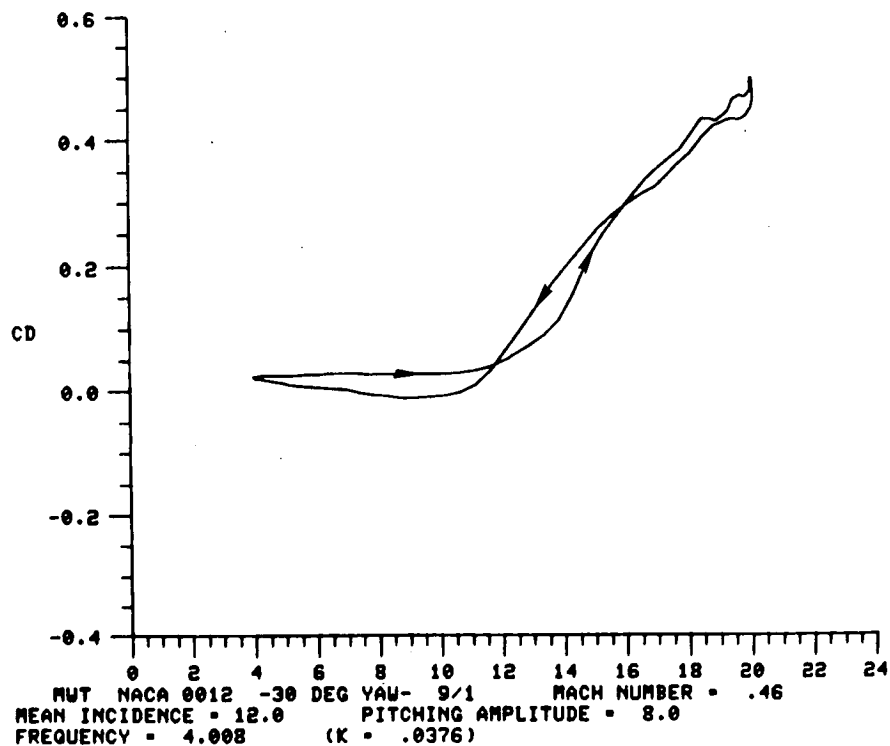
FILE 13. RUN1030.007
 FILE 13. RUN1030.007



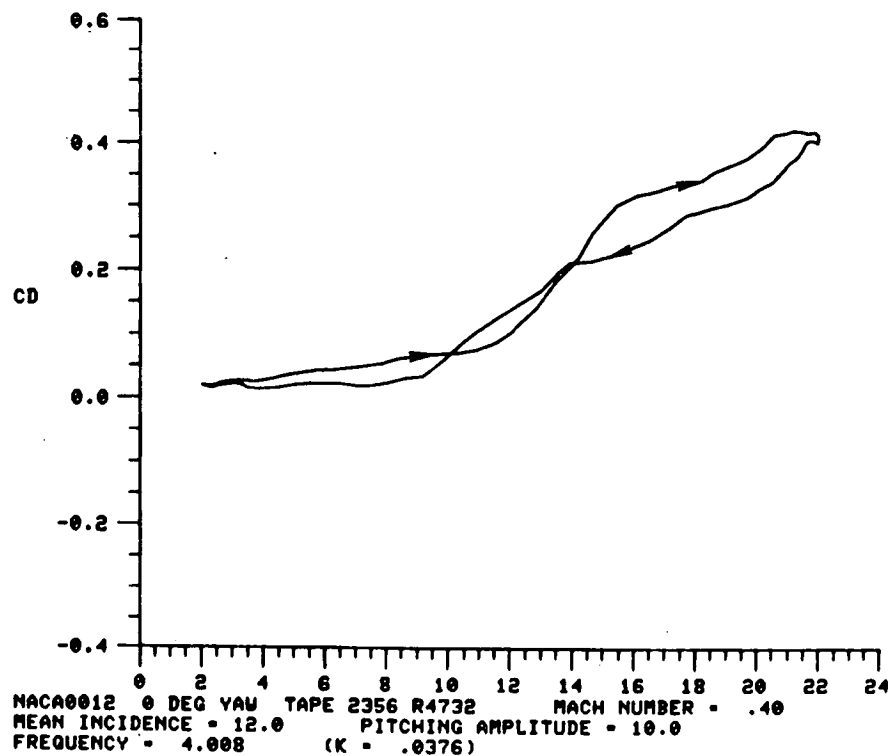
FILE 18. RUN 52.001



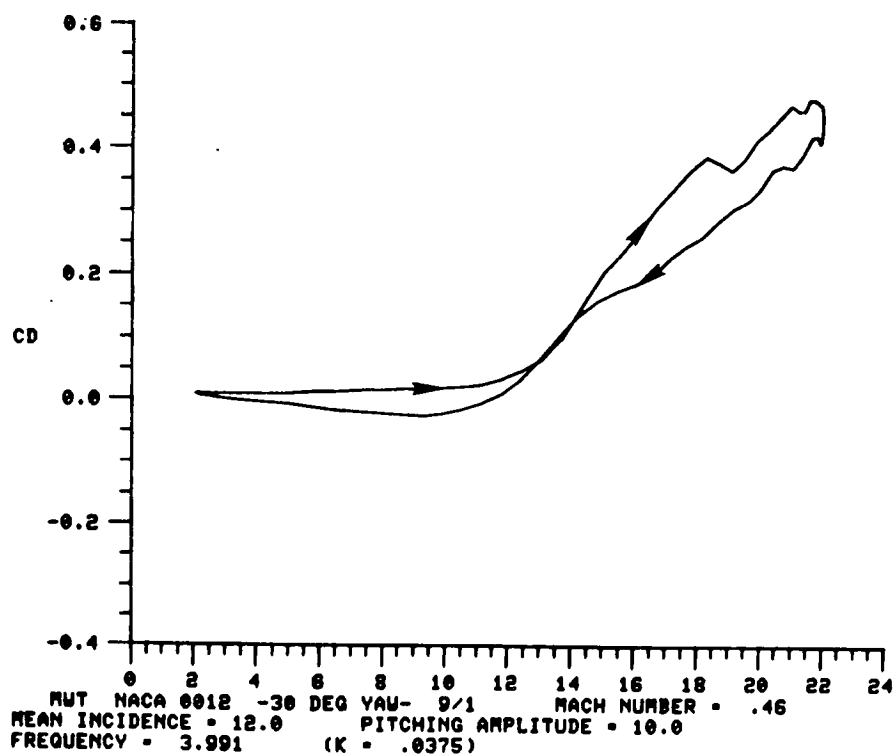
FILE 55. RUN1017.001



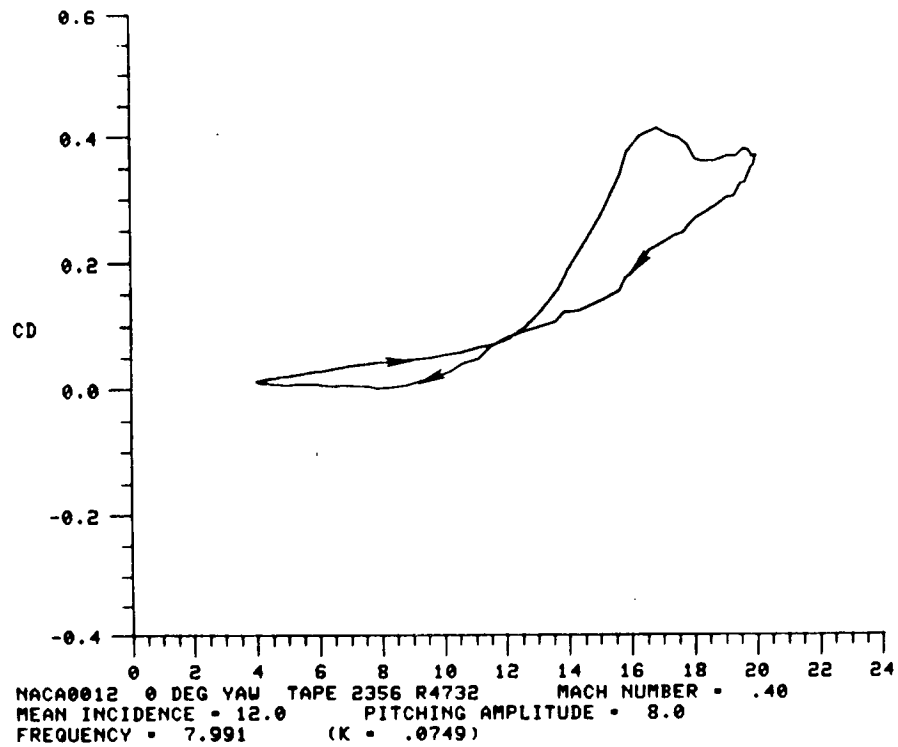
FILE 36. RUN 60.001



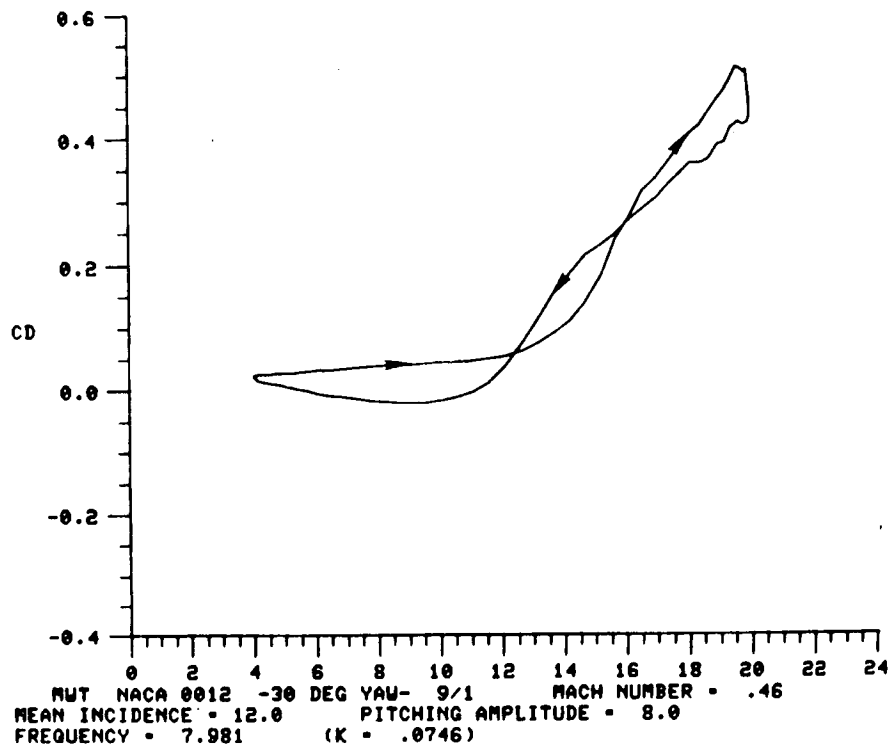
FILE 43. RUN1034.001



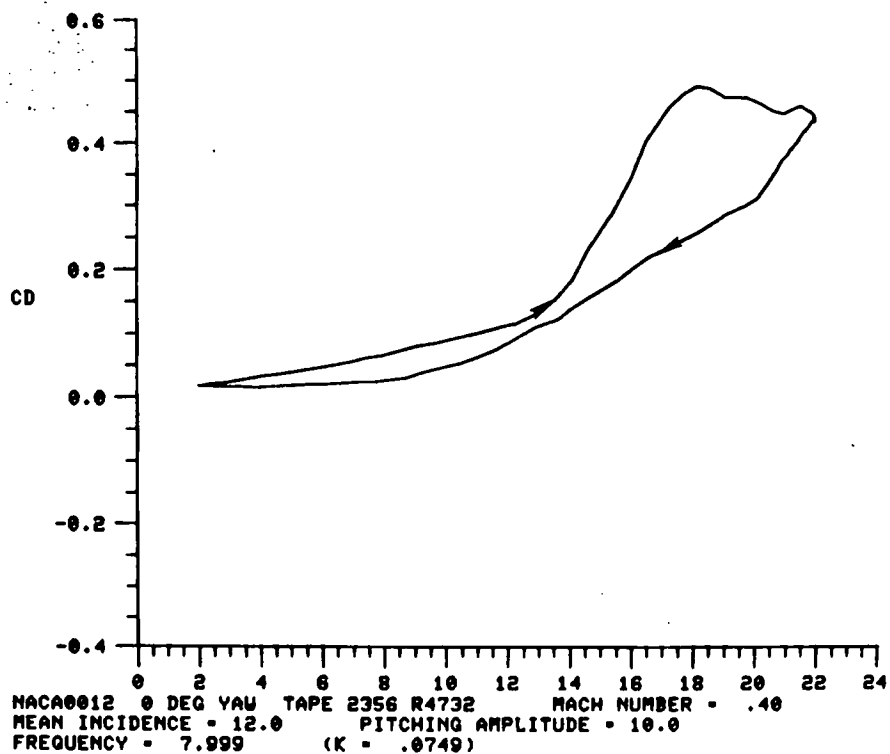
FILE 19. RUN 52.003



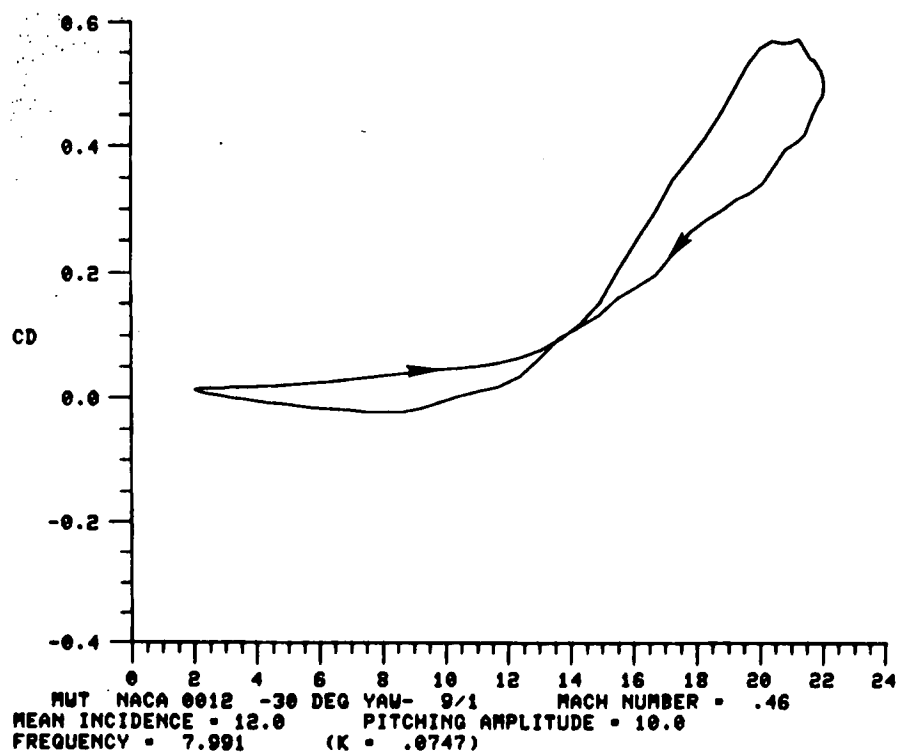
FILE 57. RUN1017.005



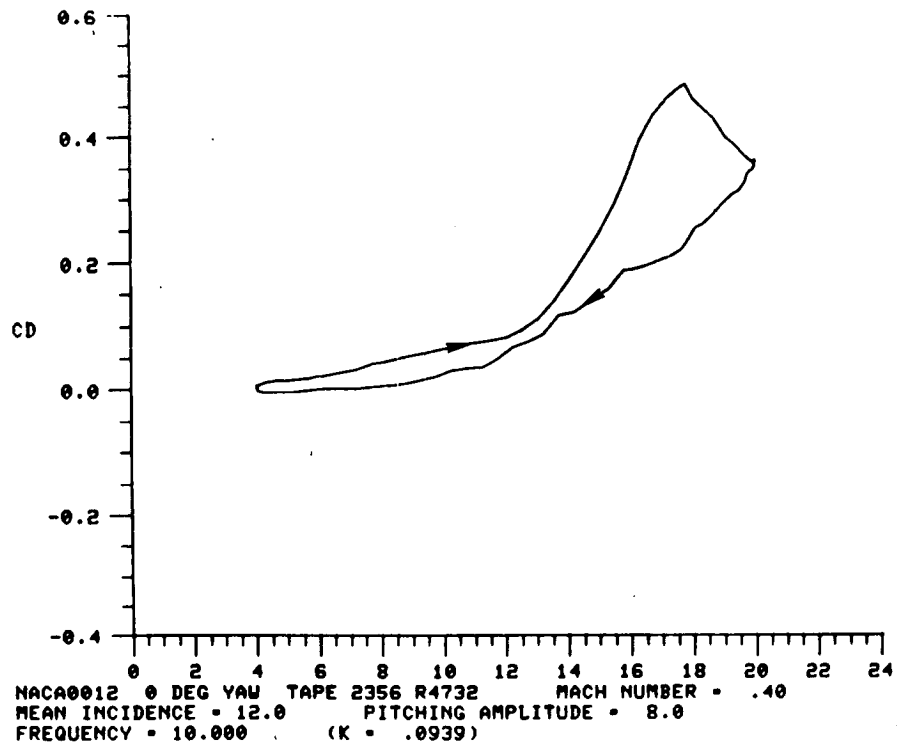
FILE 37. RUN 80.003



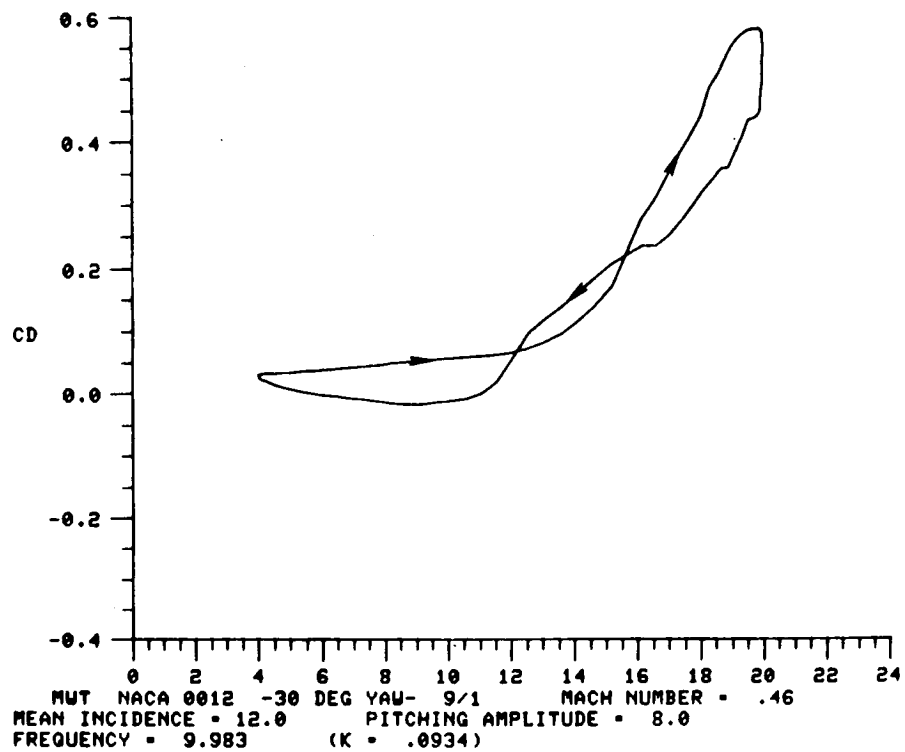
FILE 45. RUN1034.005



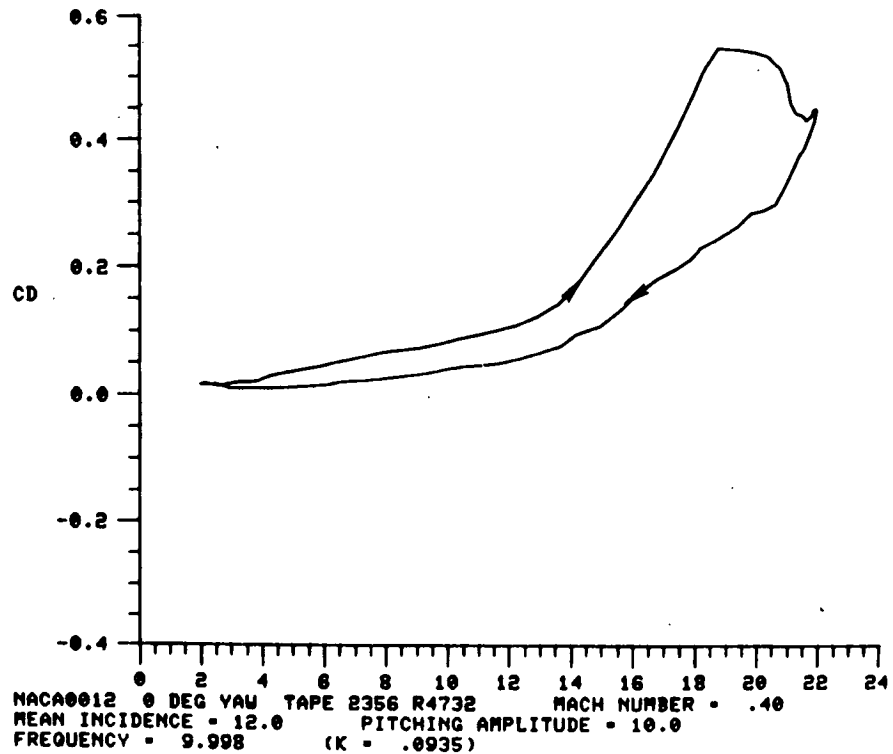
FILE 20. RUN 52.005



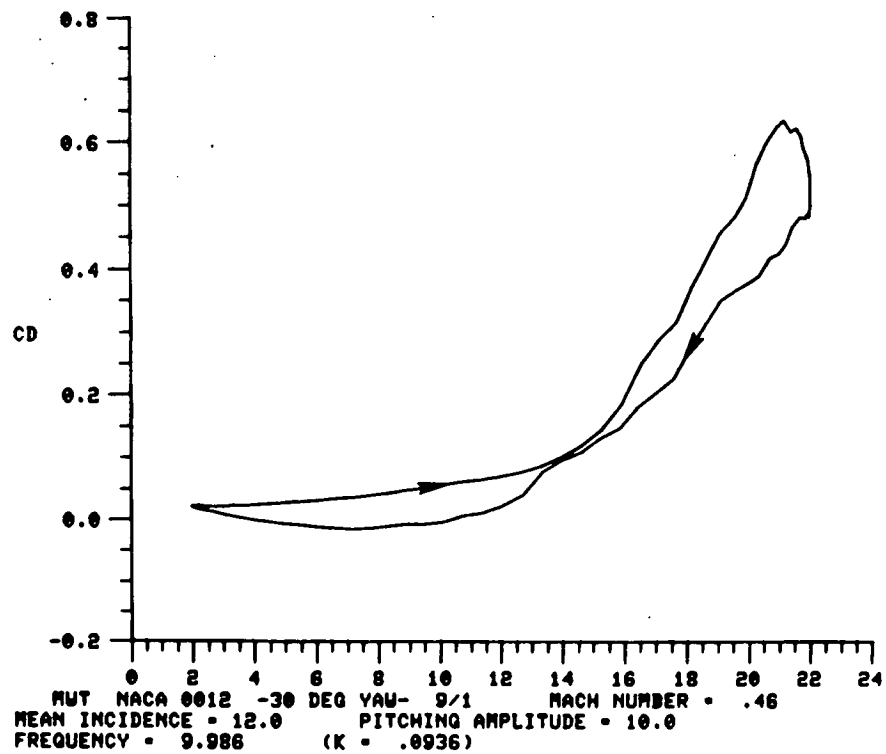
FILE 21. RUN3017.007



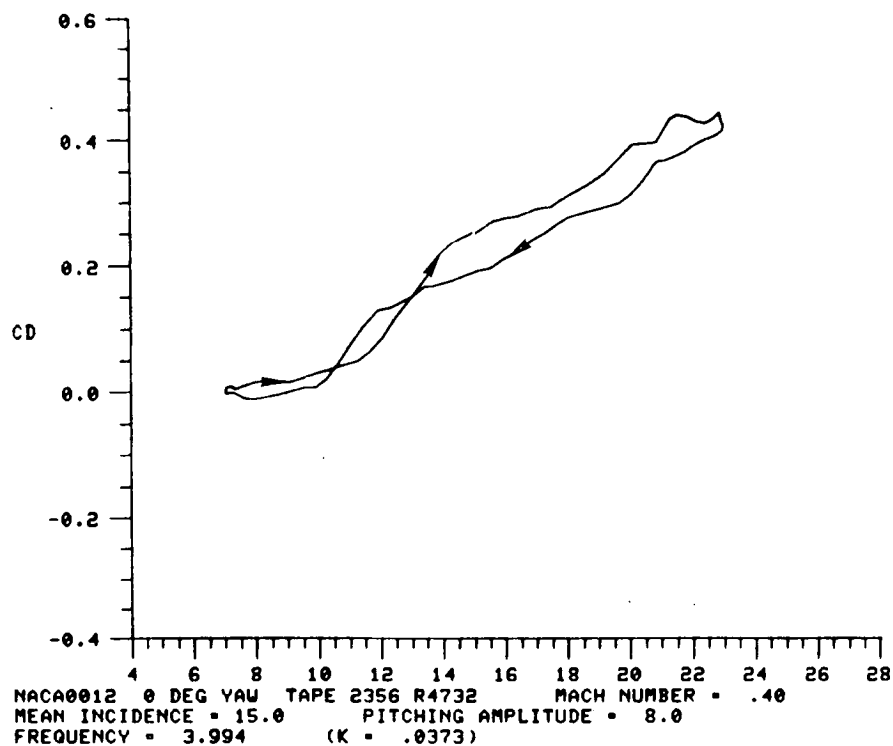
FILE 38. RUN 60.005



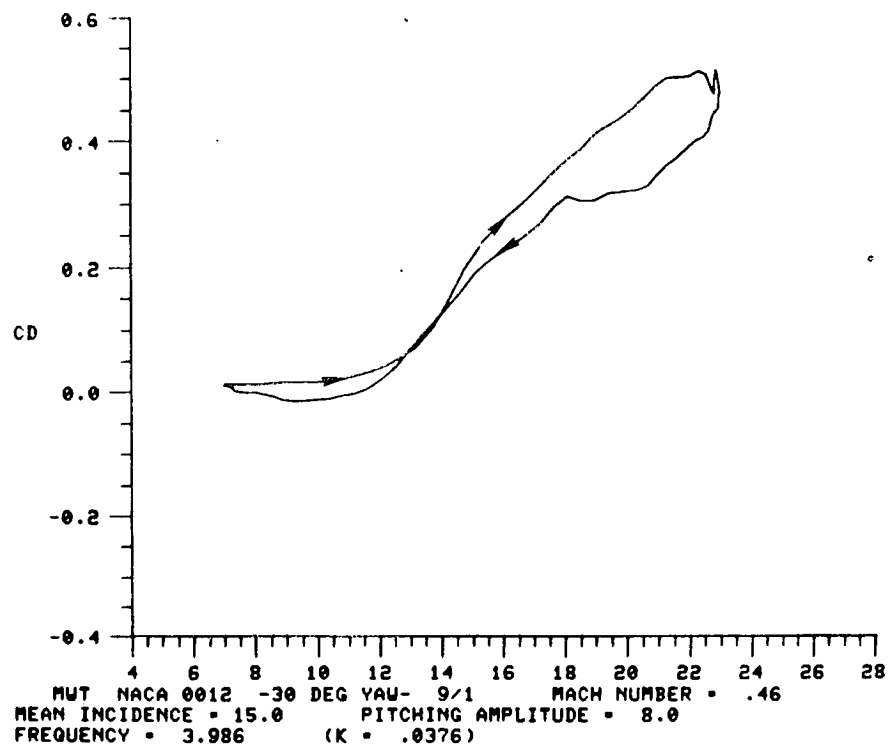
FILE 46. RUN1034.007



FILE 12. RUN 50.001

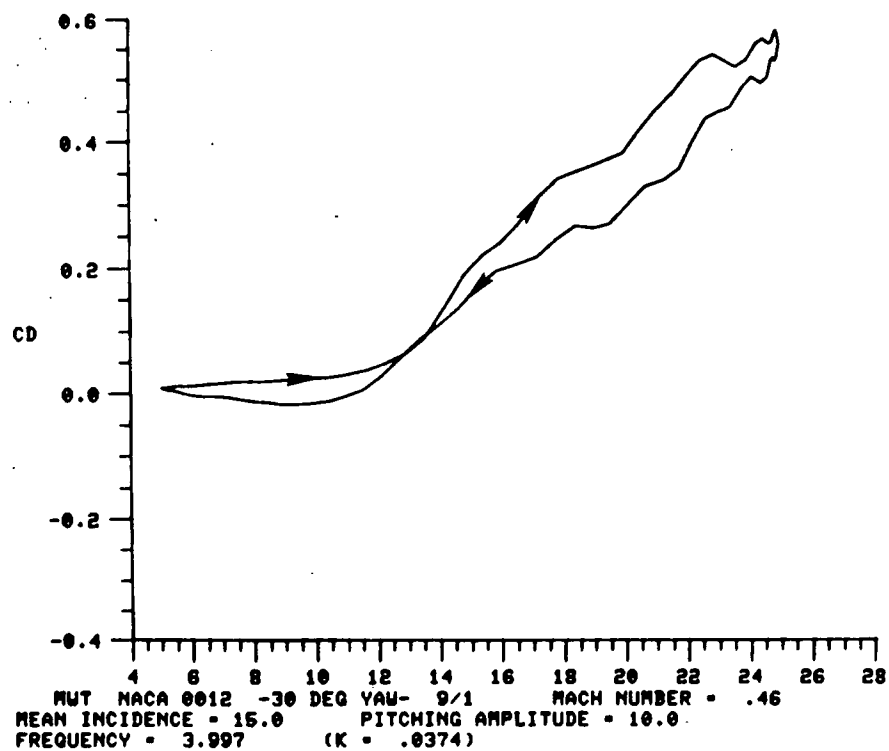


FILE 39. RUN3021.001

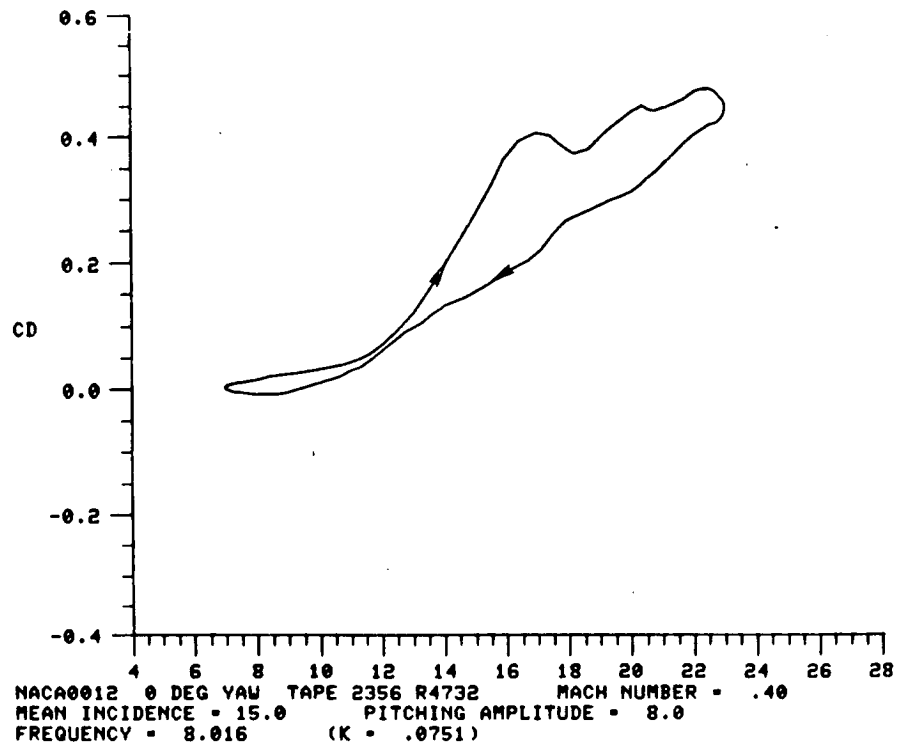


DATA WERE NOT OBTAINED

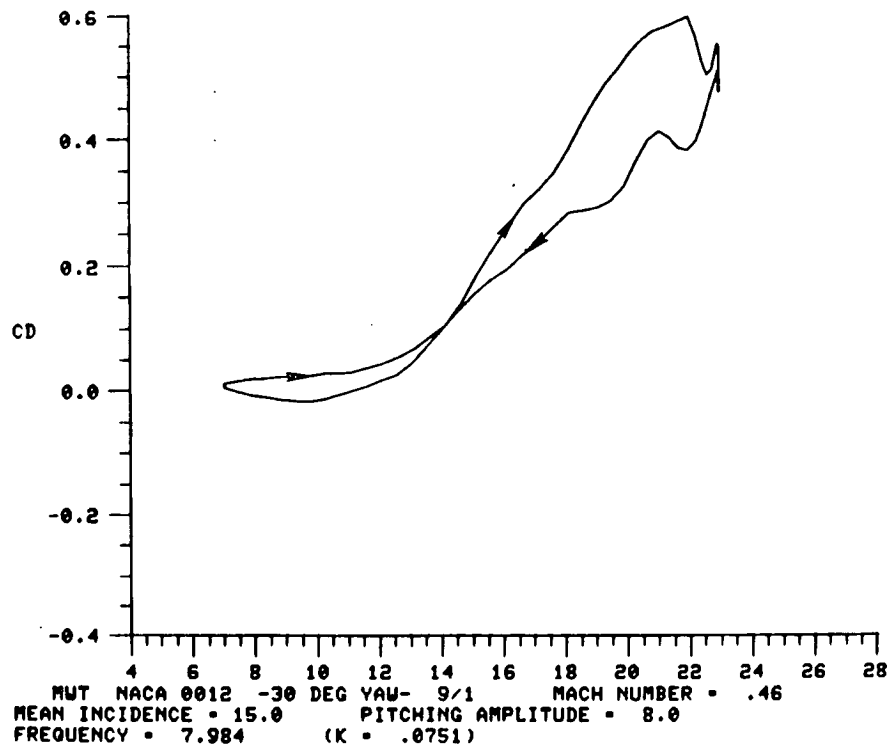
FILE 57. RUN1037.001



FILE 13. RUN 50.004

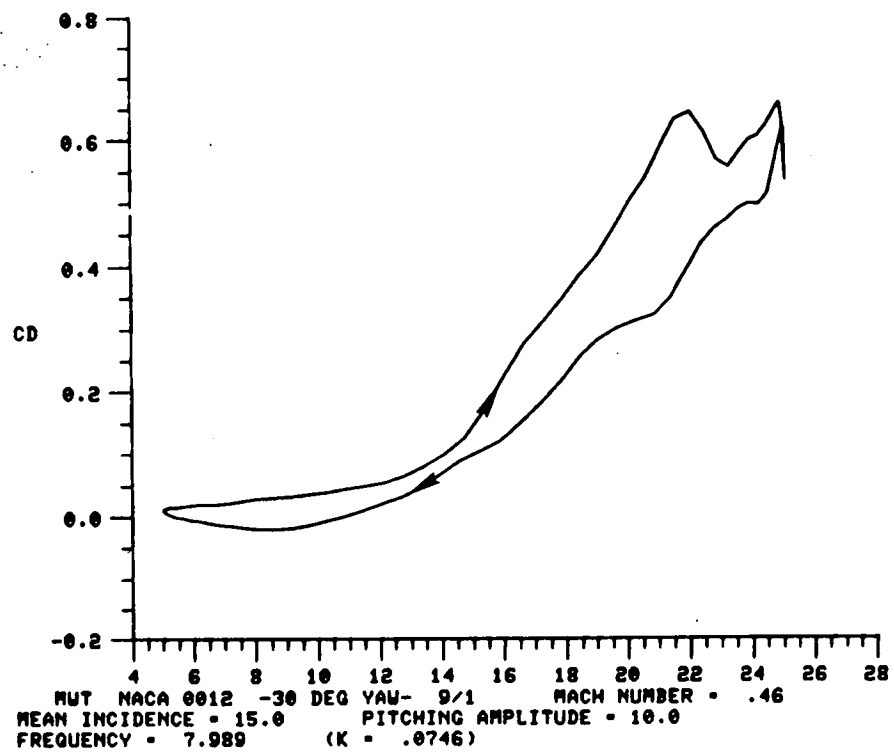


FILE 63. RUN1021.005

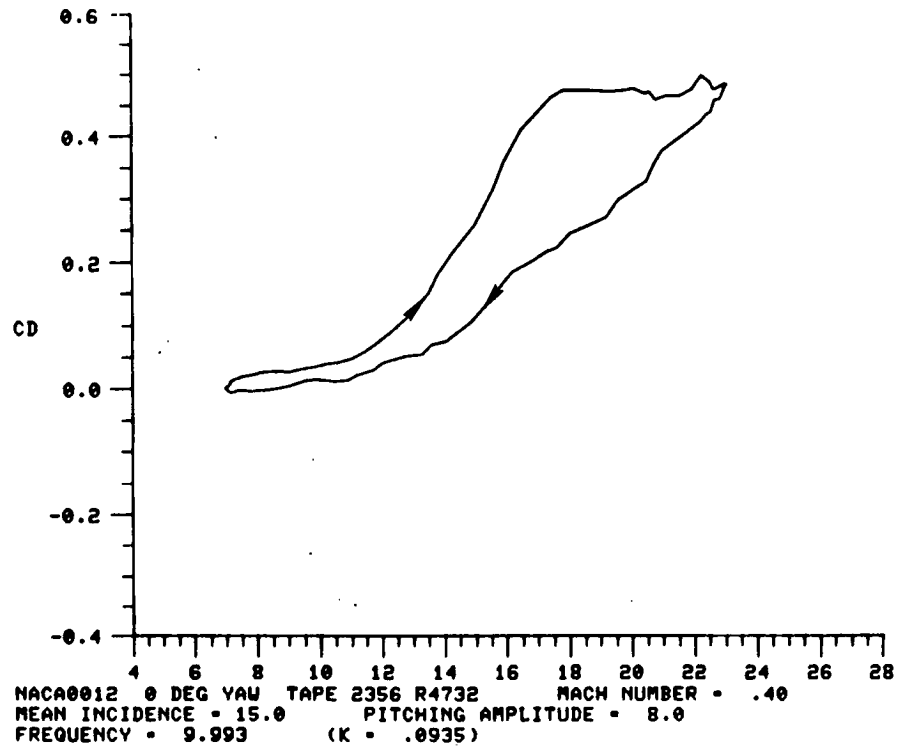


DATA WERE NOT OBTAINED

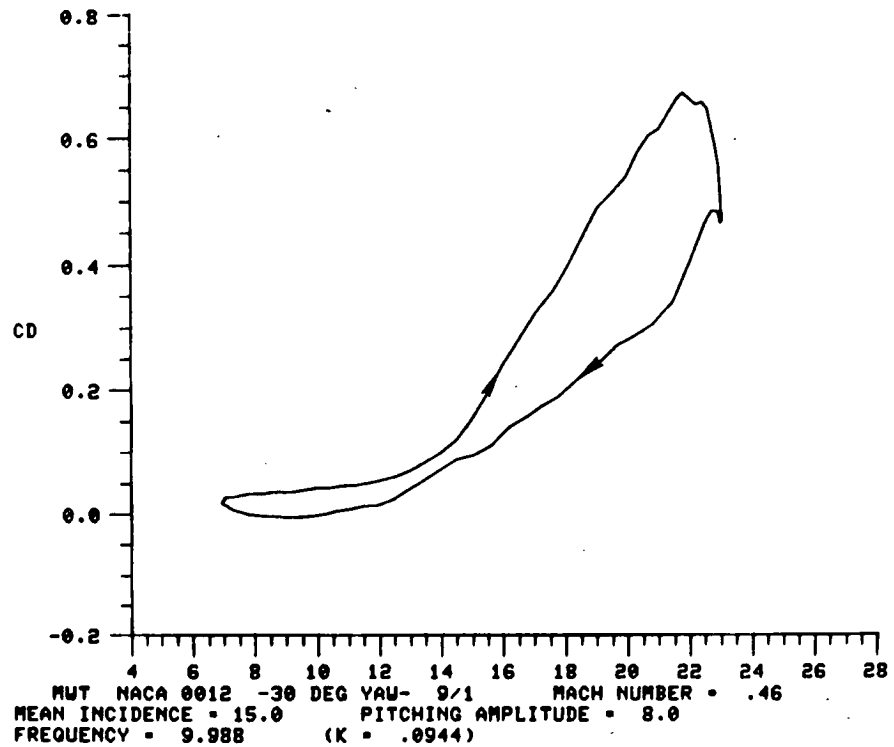
FILE 59. RUN1037.005



FILE 14. RUN 50.006

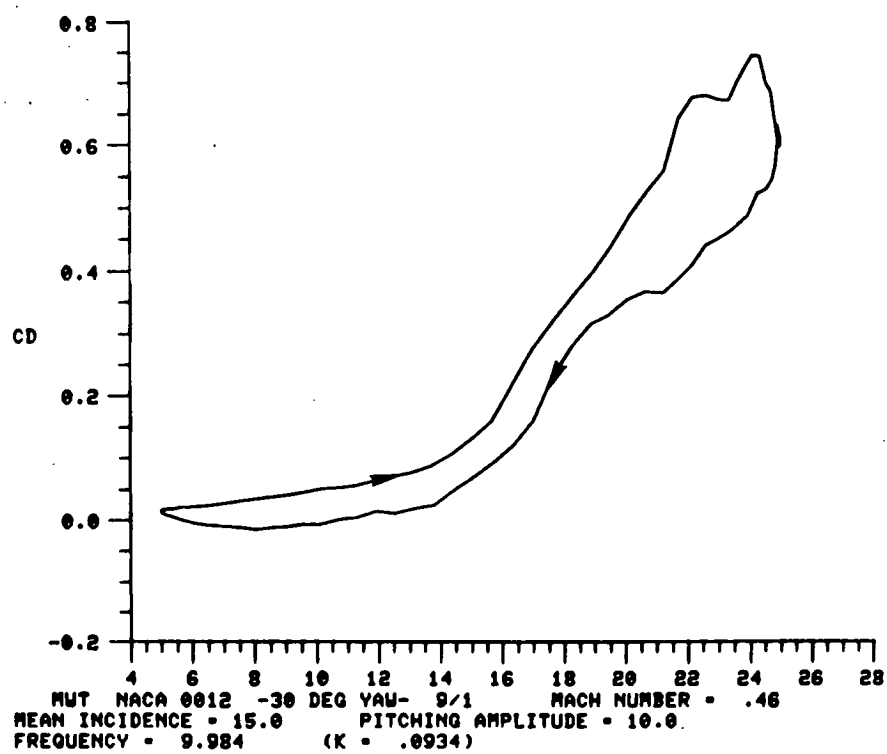


FILE 64. RUN1021.008



DATA WERE NOT OBTAINED

FILE 60. RUN1037.007

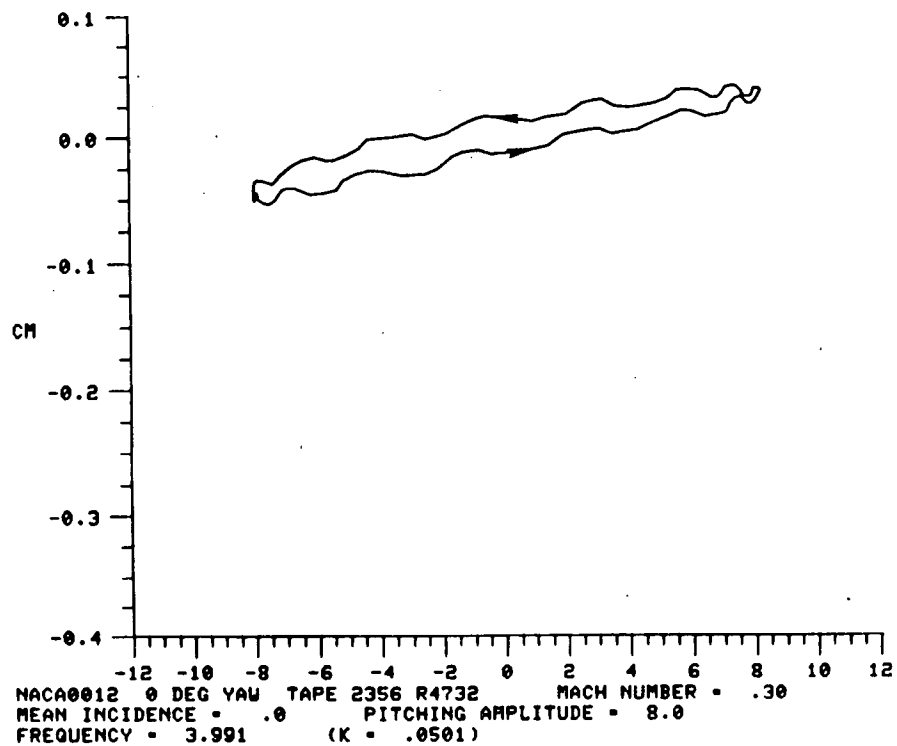


EFFECT OF SWEEP ON THE MOMENT RESPONSE *

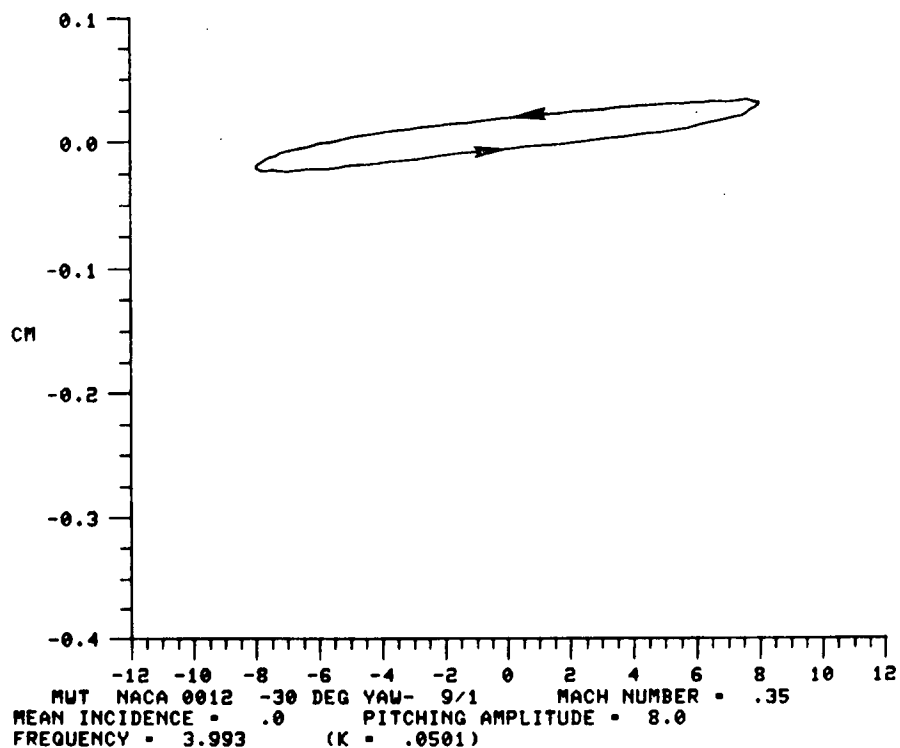
<u>Chordwise Mach Number</u>	<u>Mean Incidence Angle</u>	<u>Frequency</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0.30 ↓ 0.40 ↓	0	4.0	.050	208,209
	↓	8.0	.100	210,211
		10.0	.124	212,213
	9	4.0	.050	214,215
	↓	8.0	.100	216,217
		10.0	.124	218,219
	12	4.0	.050	220,221
	↓	8.0	.100	222,223
		10.0	.124	224,225
	15	4.0	.050	226,227
	↓	8.0	.100	228,229
		10.0	.124	230,231
	0	4.0	.037	232,233
	↓	8.0	.075	234,235
		10.0	.093	236,237
	9	4.0	.037	238,239
	↓	8.0	.075	240,241
		10.0	.093	242,243
	12	4.0	.037	244,245
	↓	8.0	.075	246,247
		10.0	.093	248,249
	15	4.0	.037	250,251
	↓	8.0	.075	252,253
		10.0	.093	254,255

* The effect of sweep is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

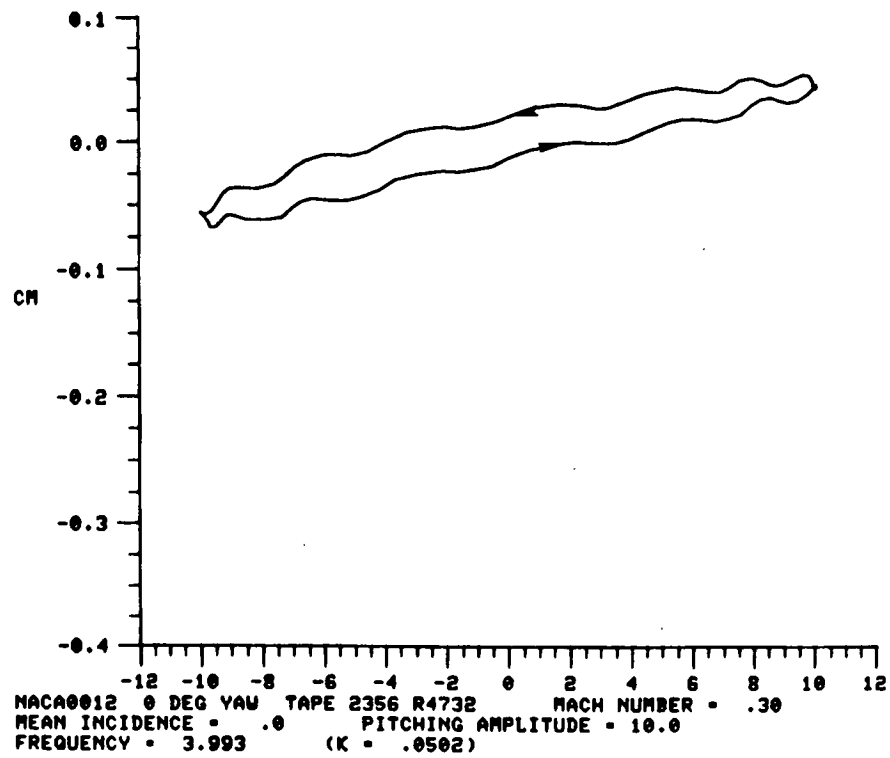
FILE 21. RUN 53.001



FILE 8. RUN1007.005

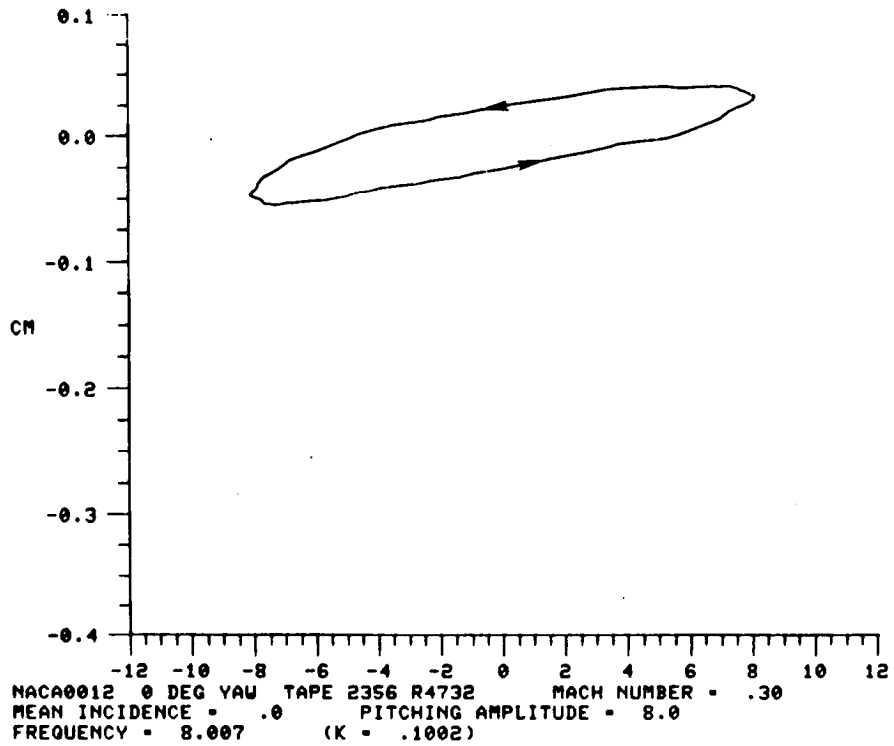


FILE 27. RUN 57.001

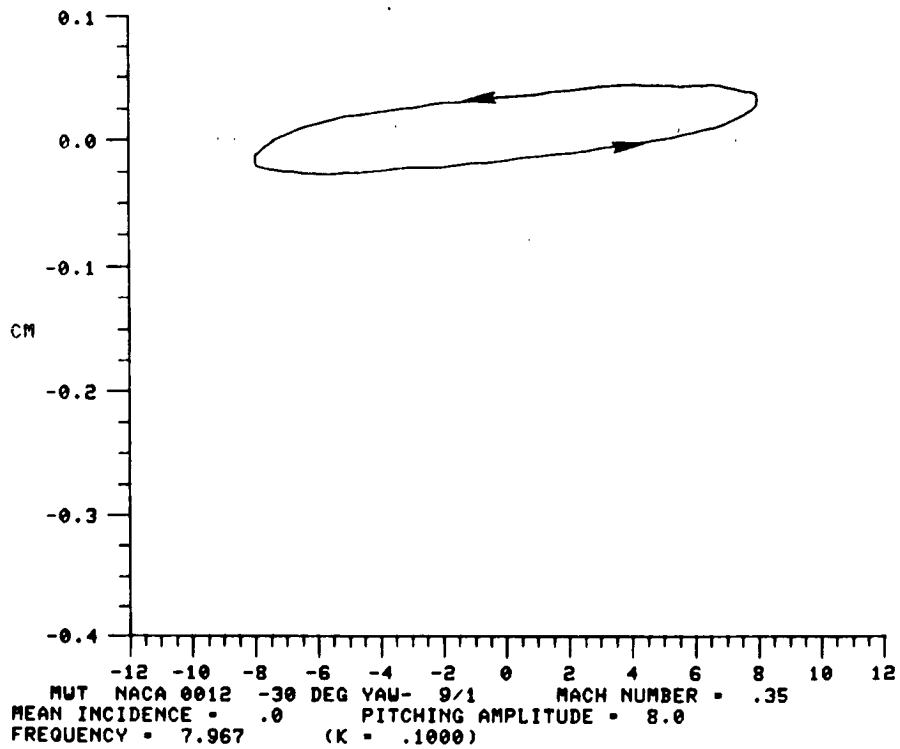


DATA WERE NOT OBTAINED

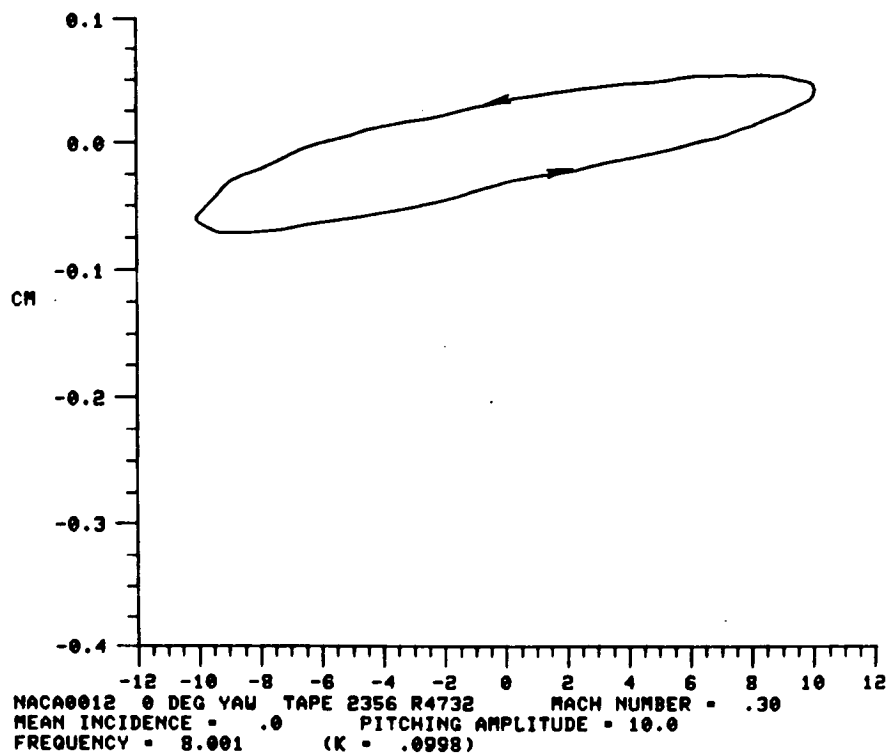
FILE 22. RUN 53.003



FILE 10. RUN1007.009

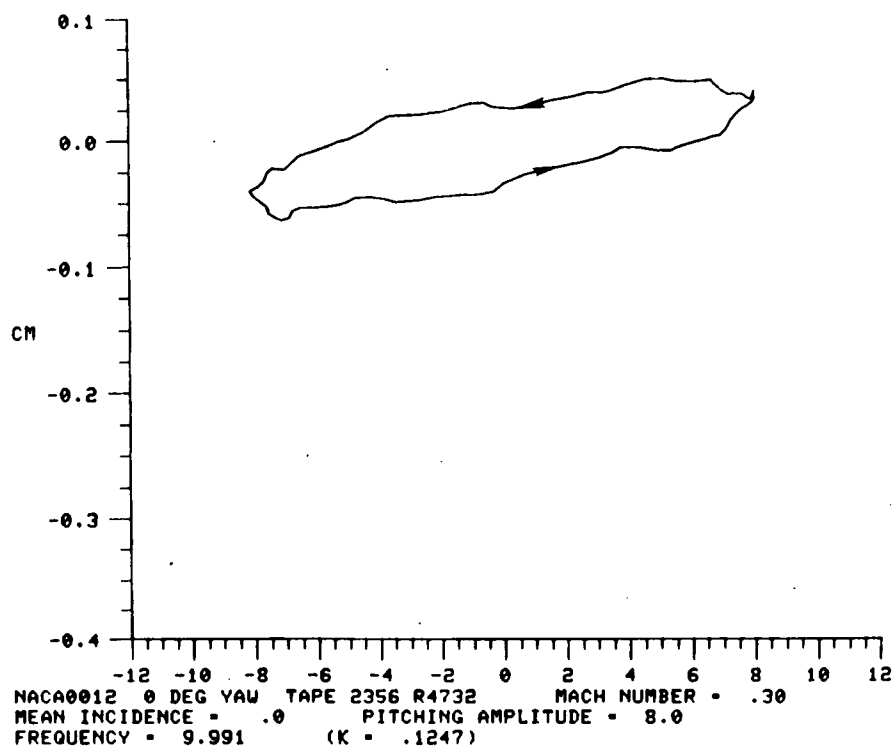


FILE 28. RUN 57.003

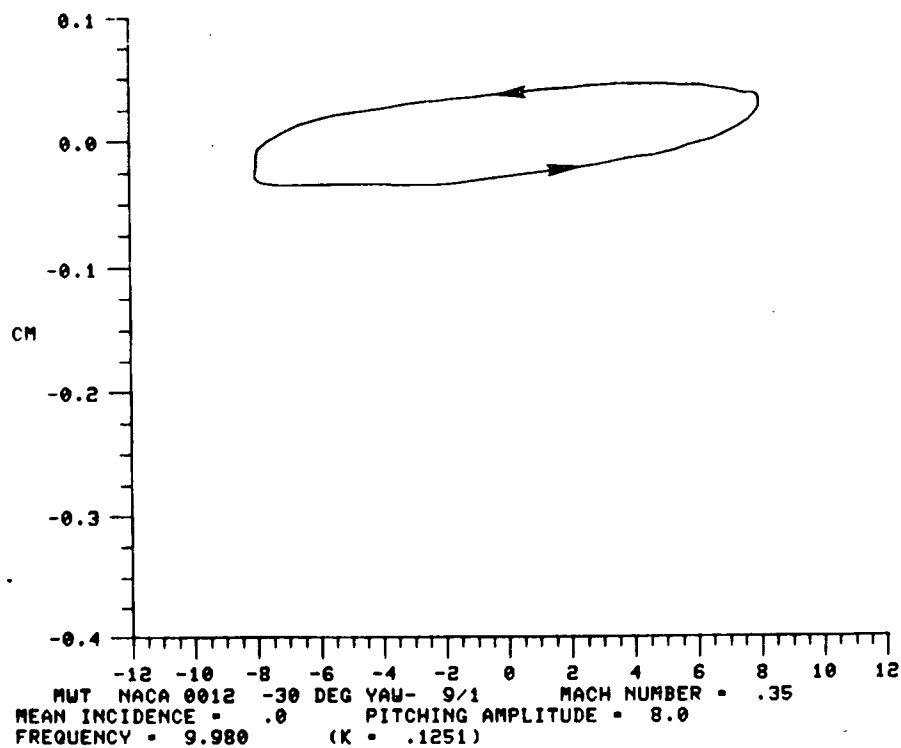


DATA WERE NOT OBTAINED

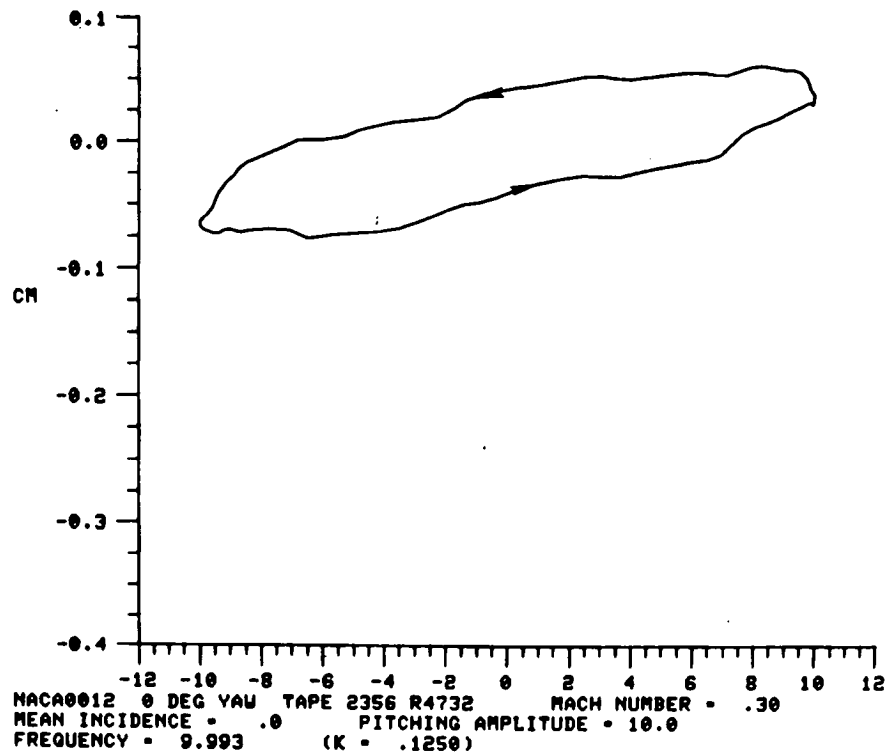
FILE 23. RUN 53.005



FILE 11. RUN1007.011

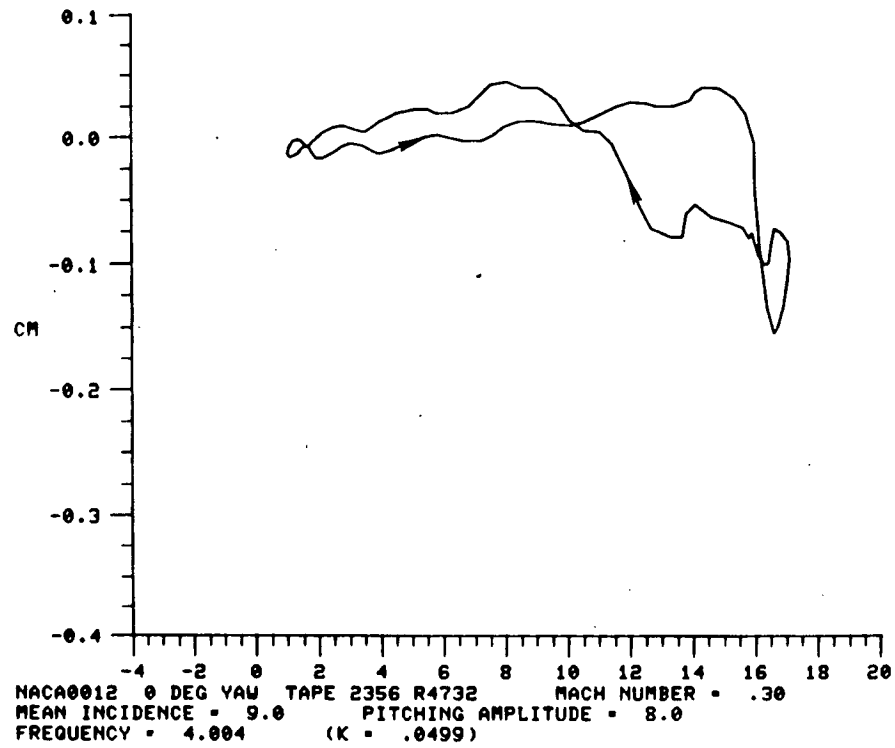


FILE 89. RUN 57.005

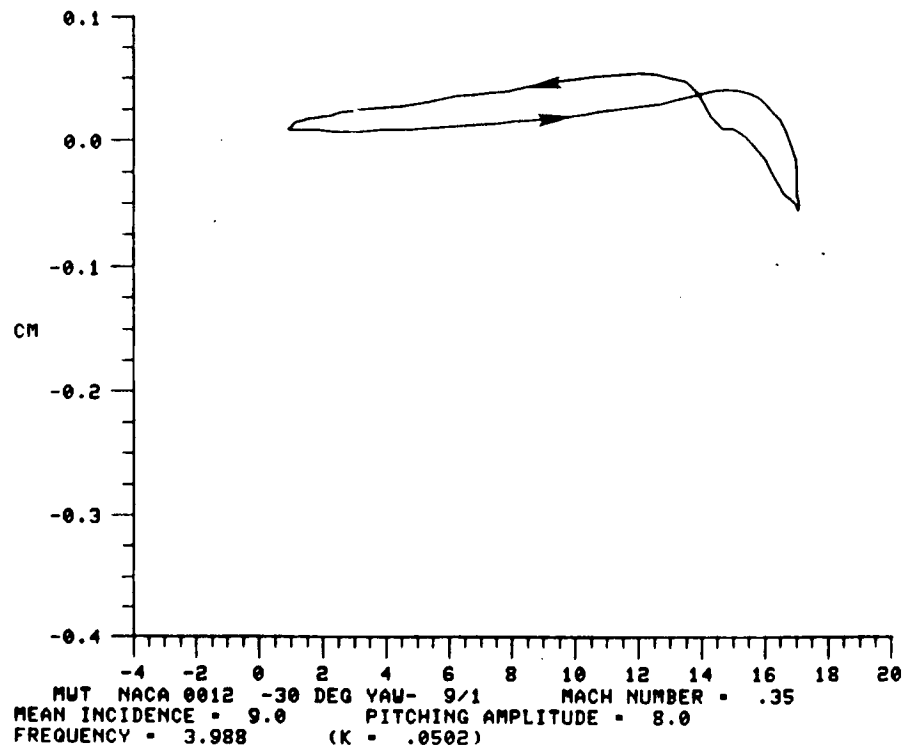


DATA WERE NOT OBTAINED

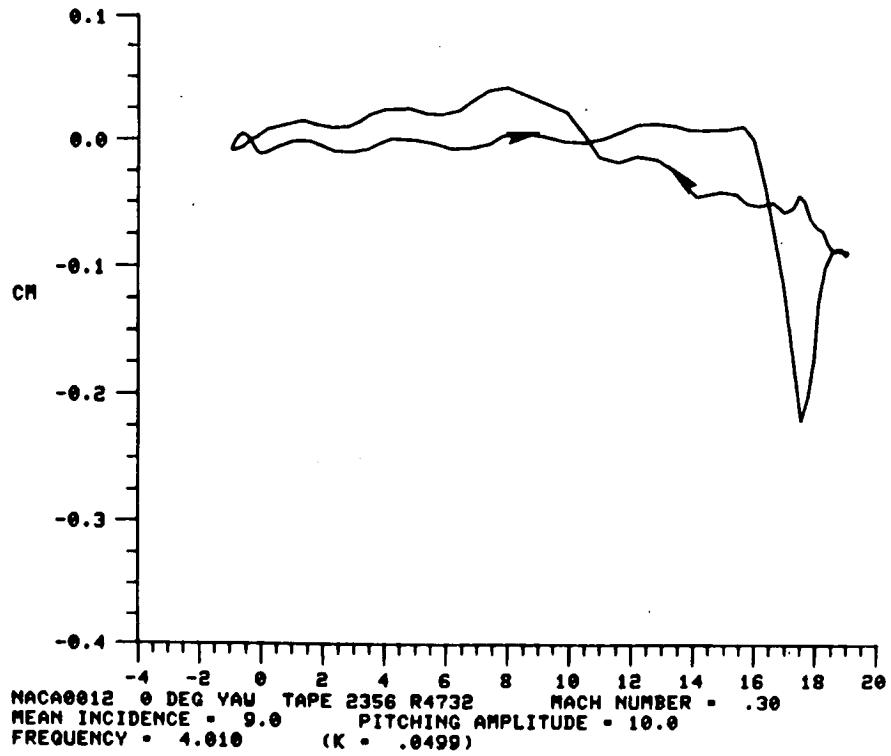
FILE 3. RUN 47.001



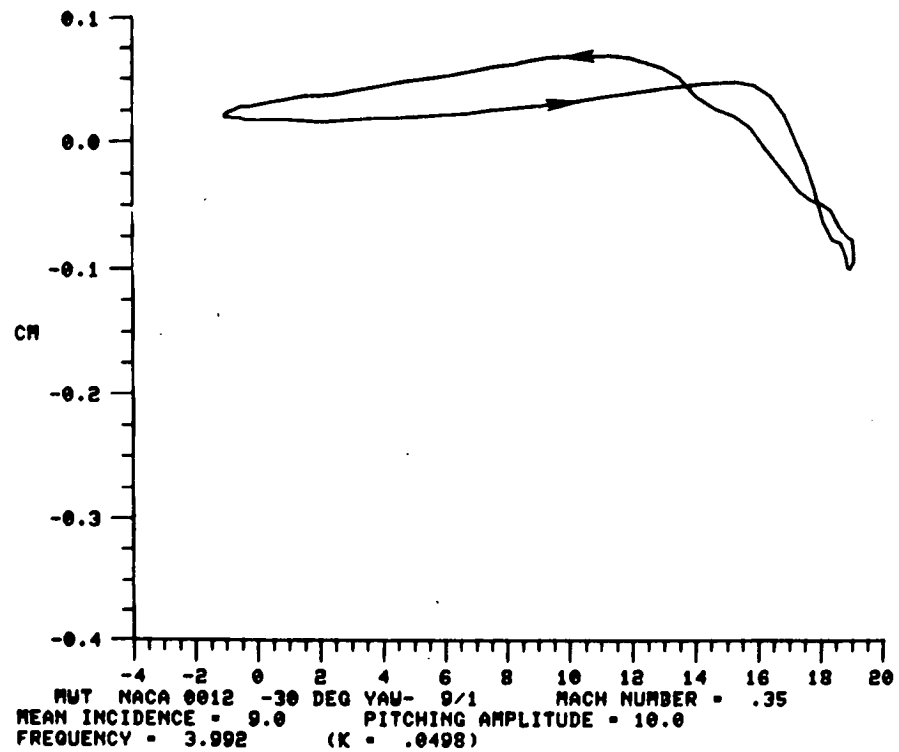
FILE 26. RUN1018.013



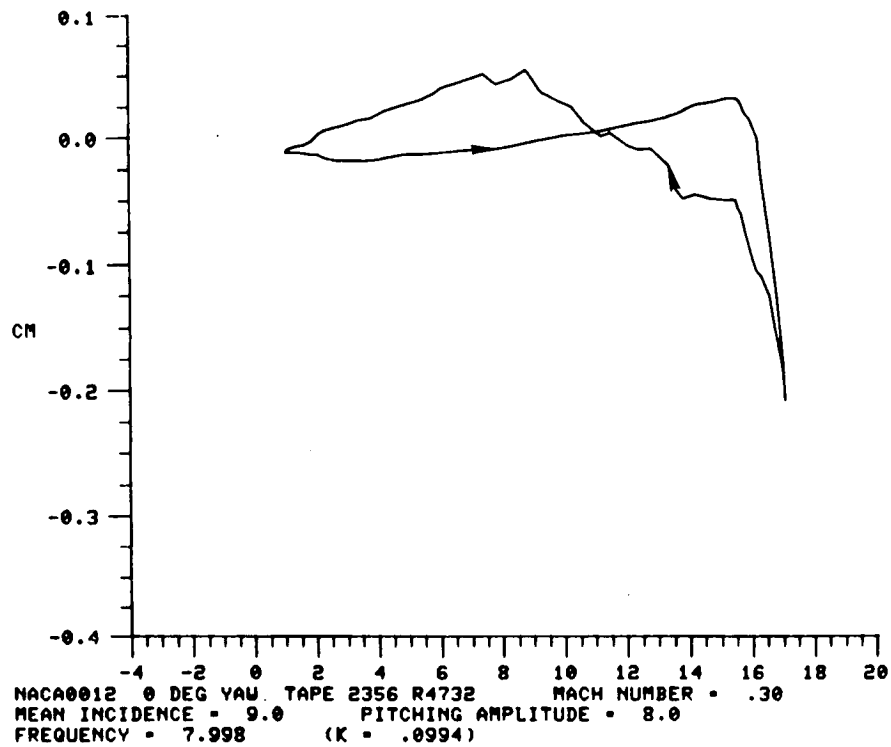
FILE 39. RUN 61.001



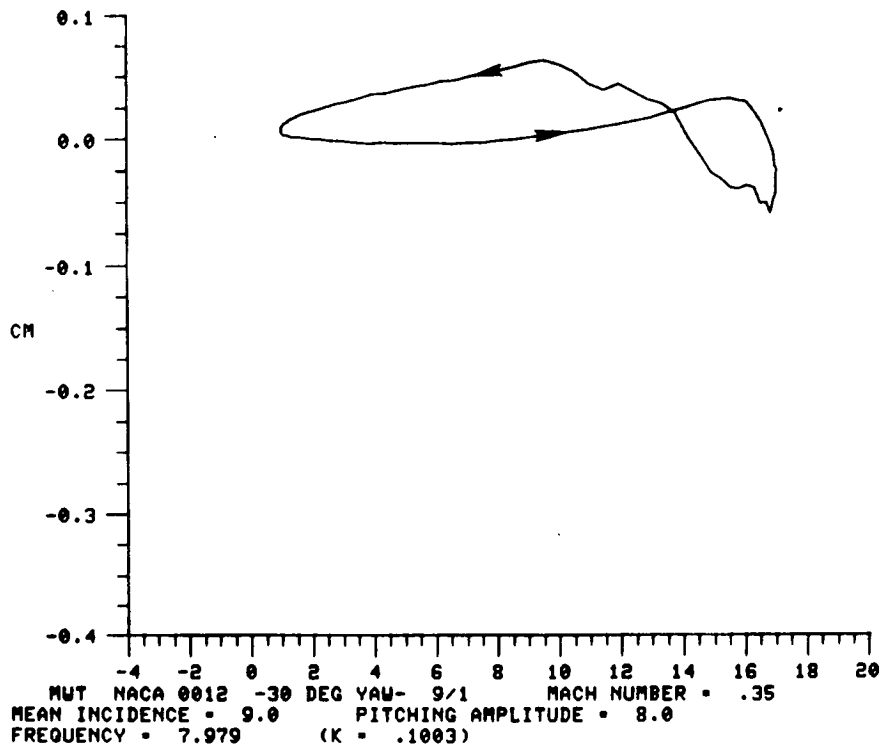
FILE 6. RUN1029.008



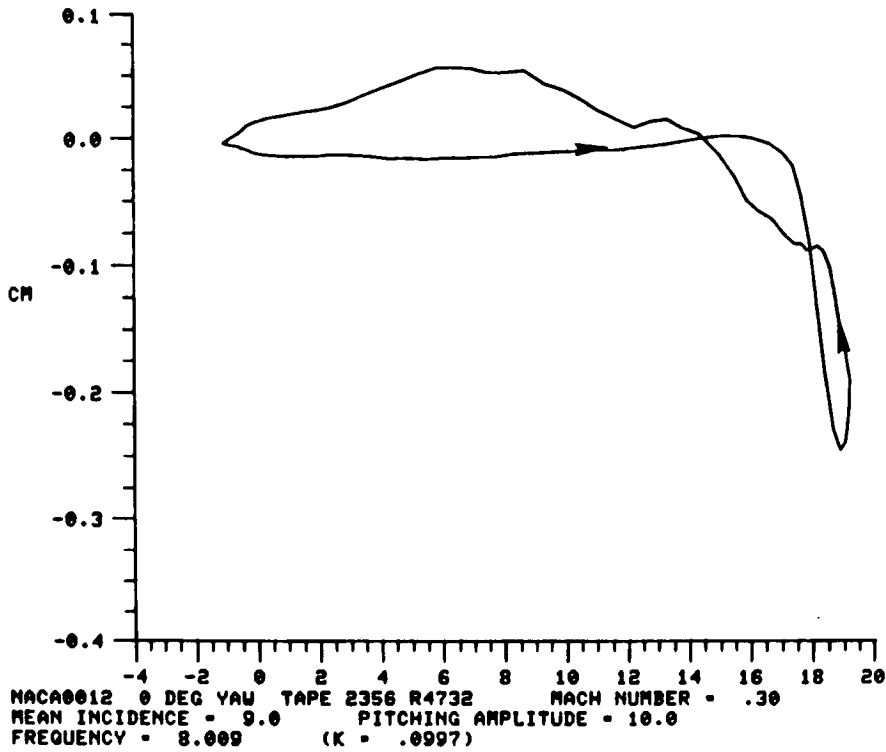
FILE 4. RUN 47.003



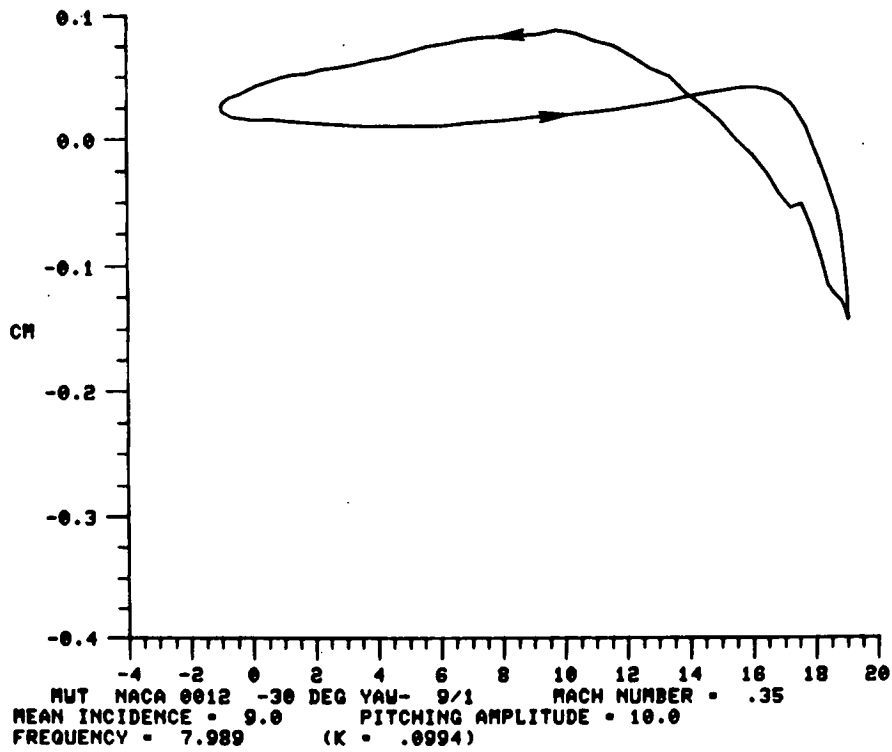
FILE 28. RUN1018.017



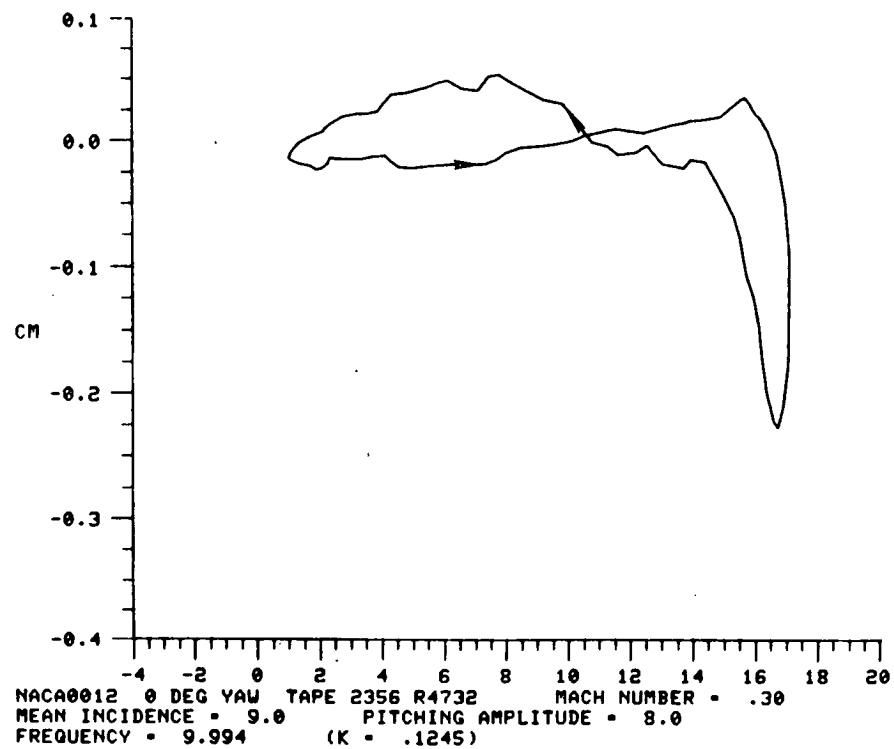
FILE 40. RUN 61.004



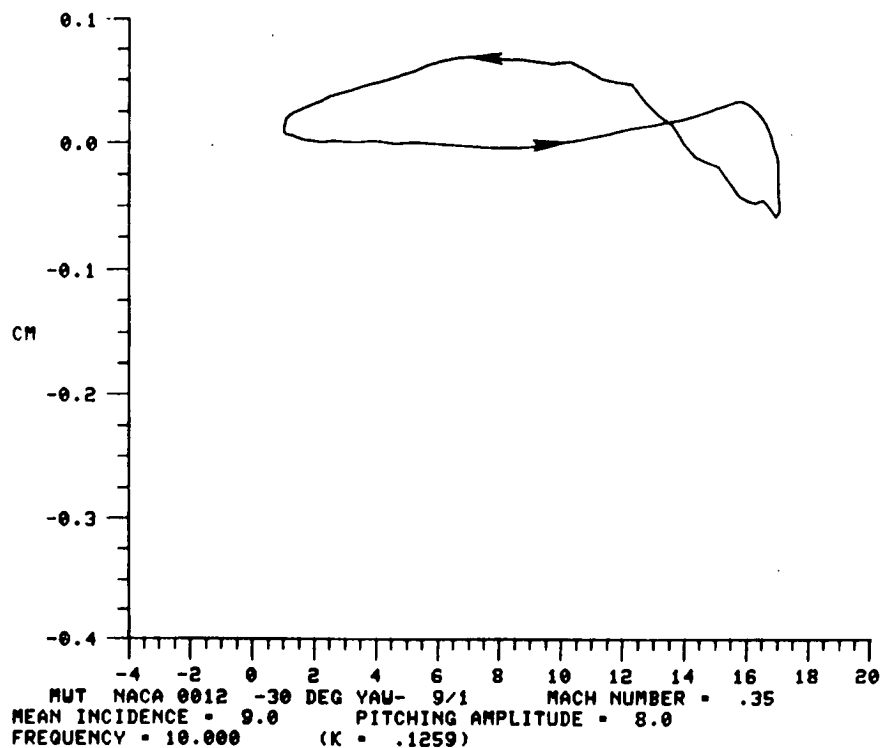
FILE 8. RUN1029.012



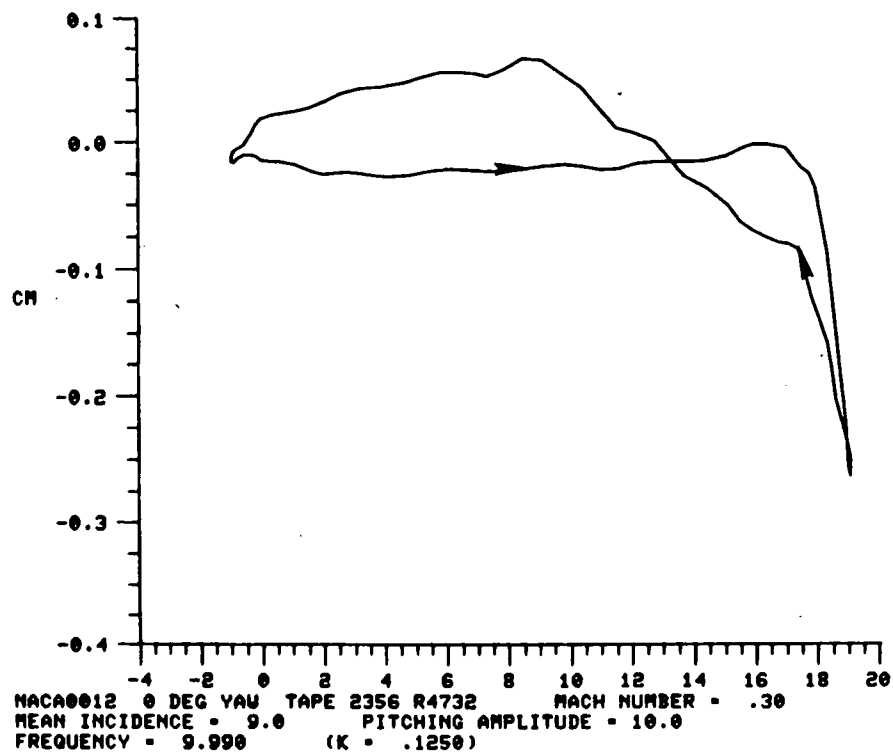
FILE 5. RUN 47.005



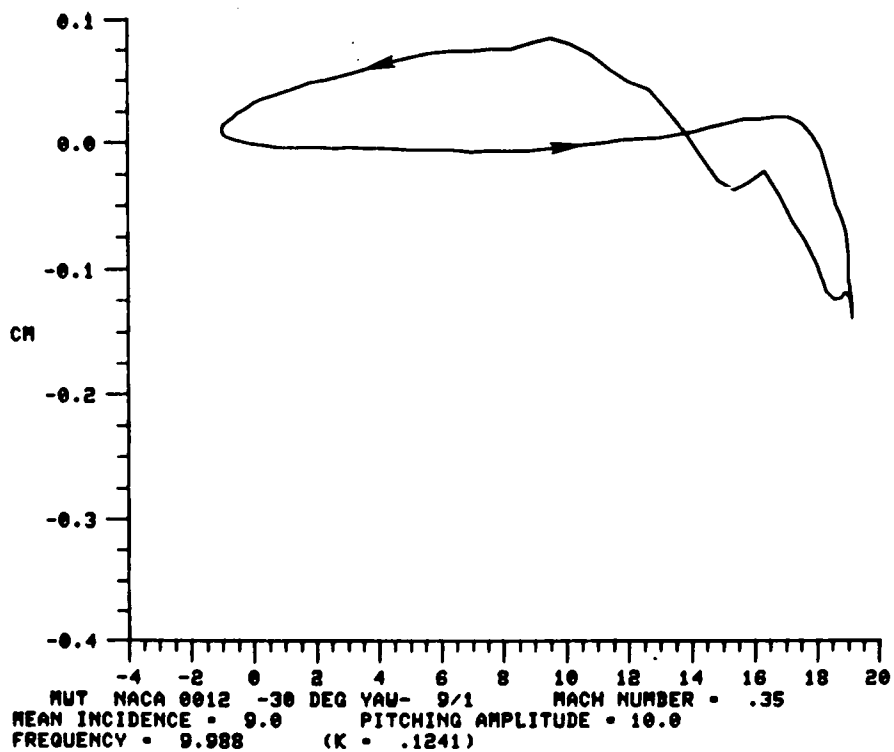
FILE 29. RUN1018.019



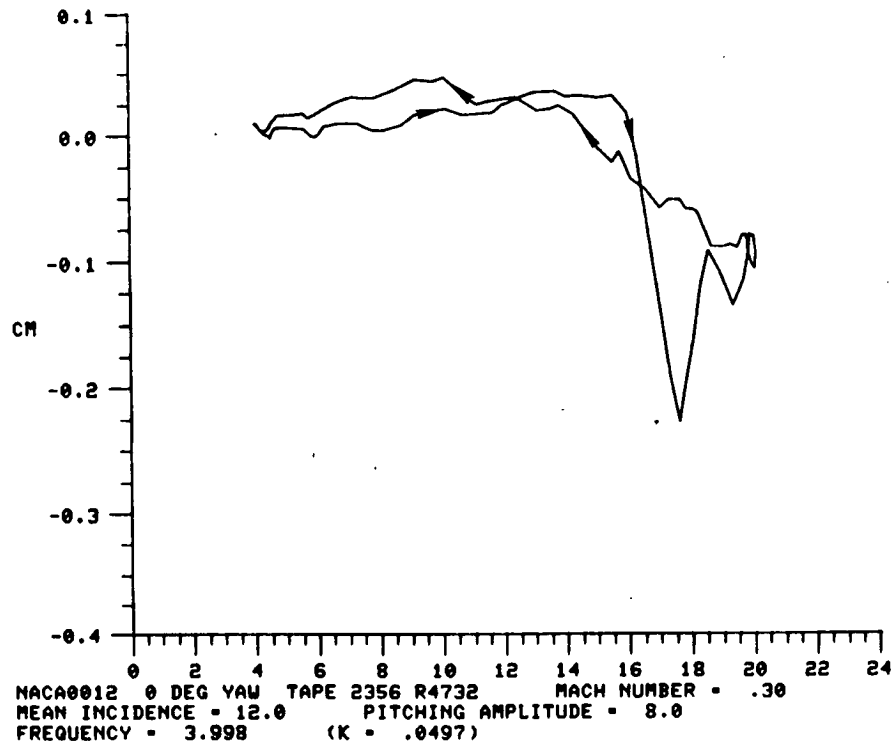
FILE 41. RUN 61.008



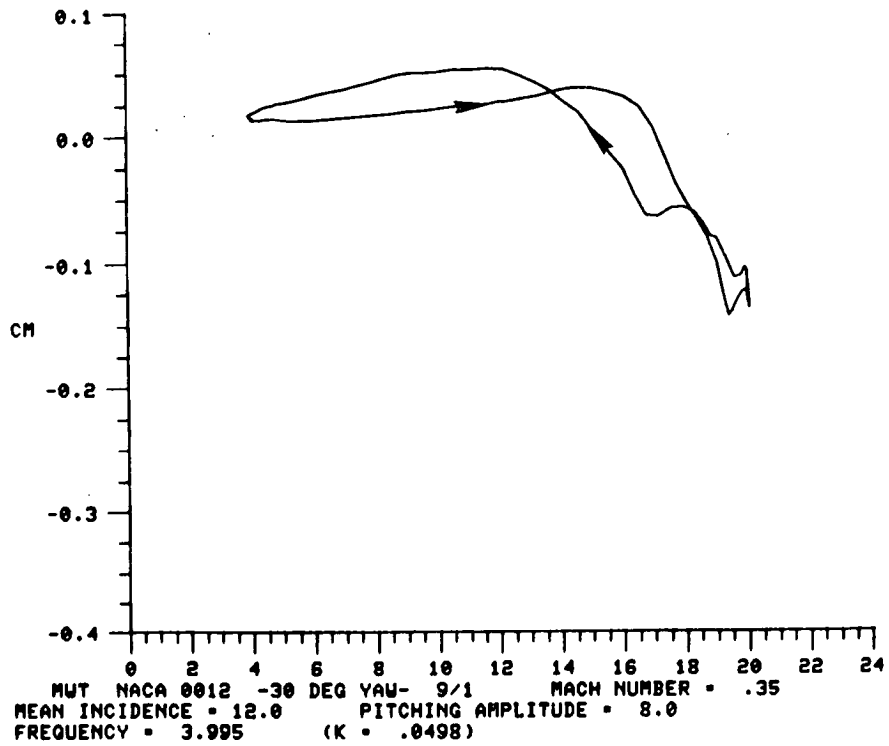
FILE 9. RUN1029.014



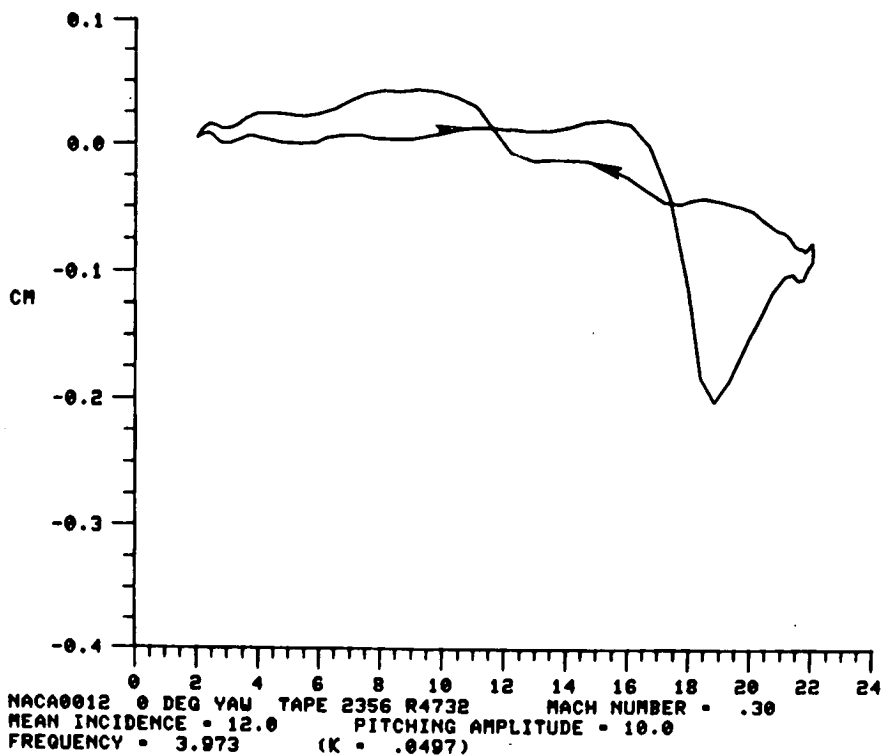
FILE 15. RUN 51.001



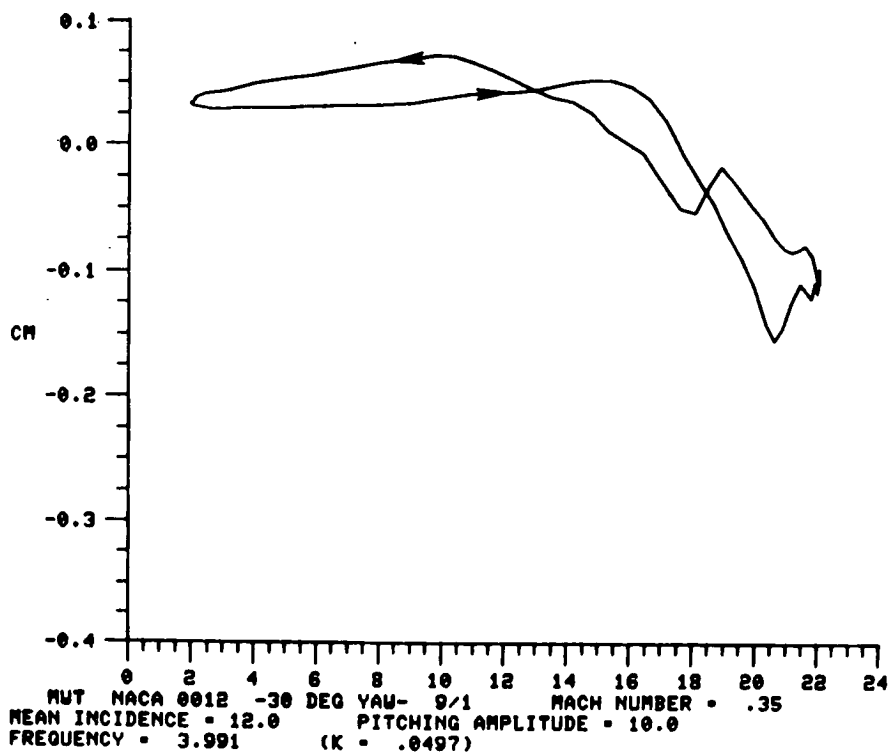
FILE 53. RUN1016.004



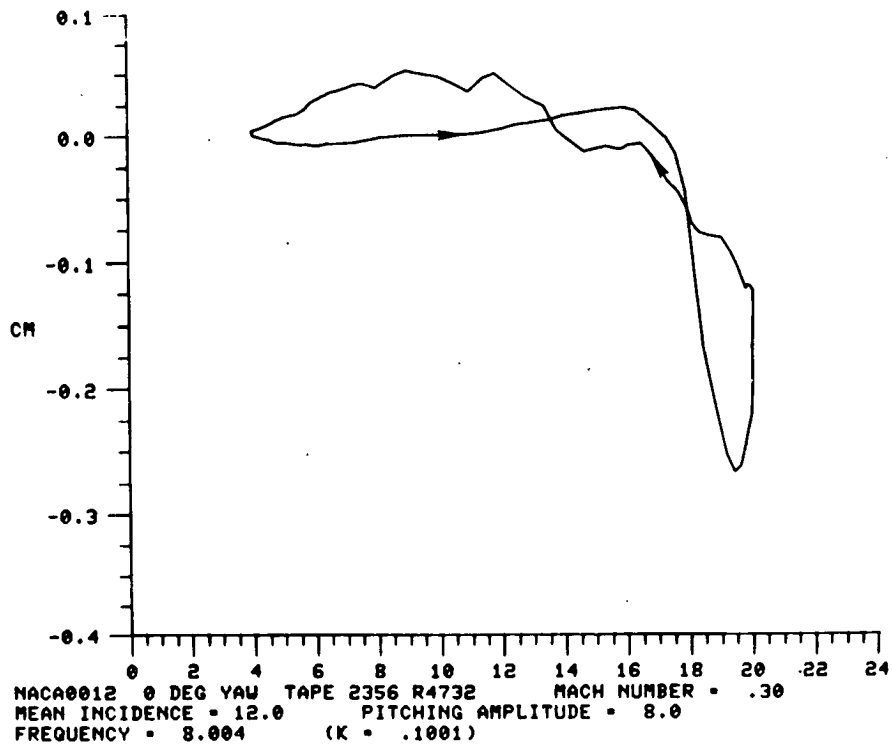
FILE 33. RUN 59.001



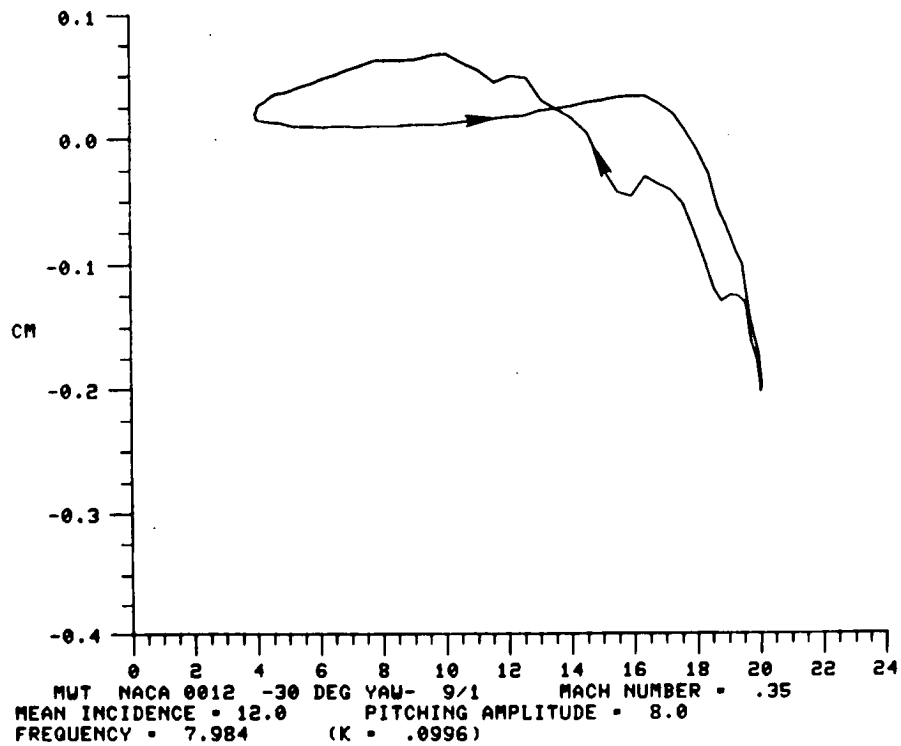
FILE 39. RUN1033.008



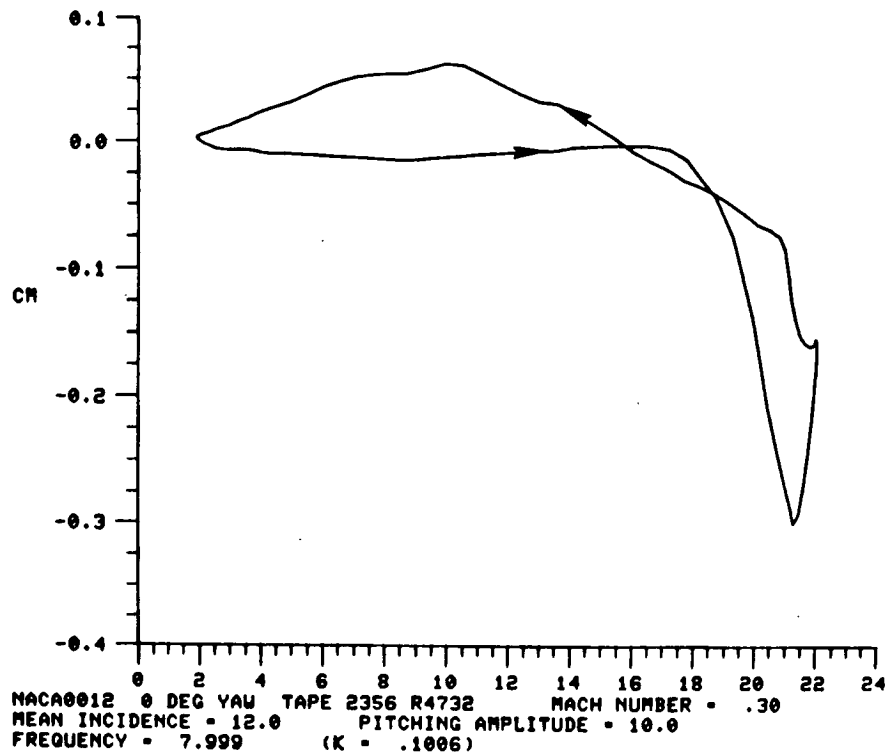
FILE 16. RUN 51.003



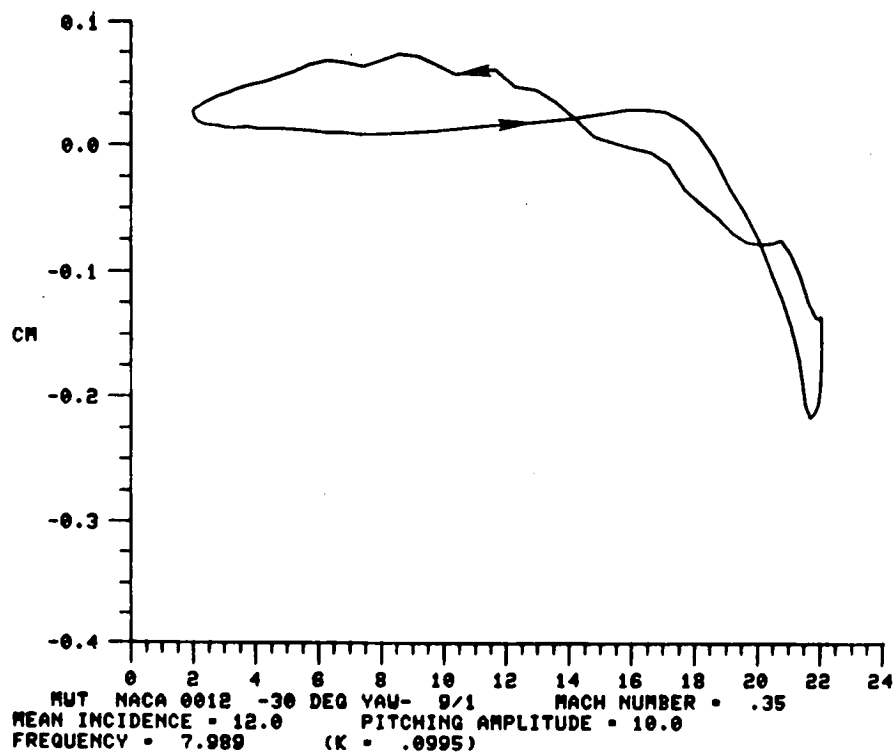
FILE 19. RUN1016.010



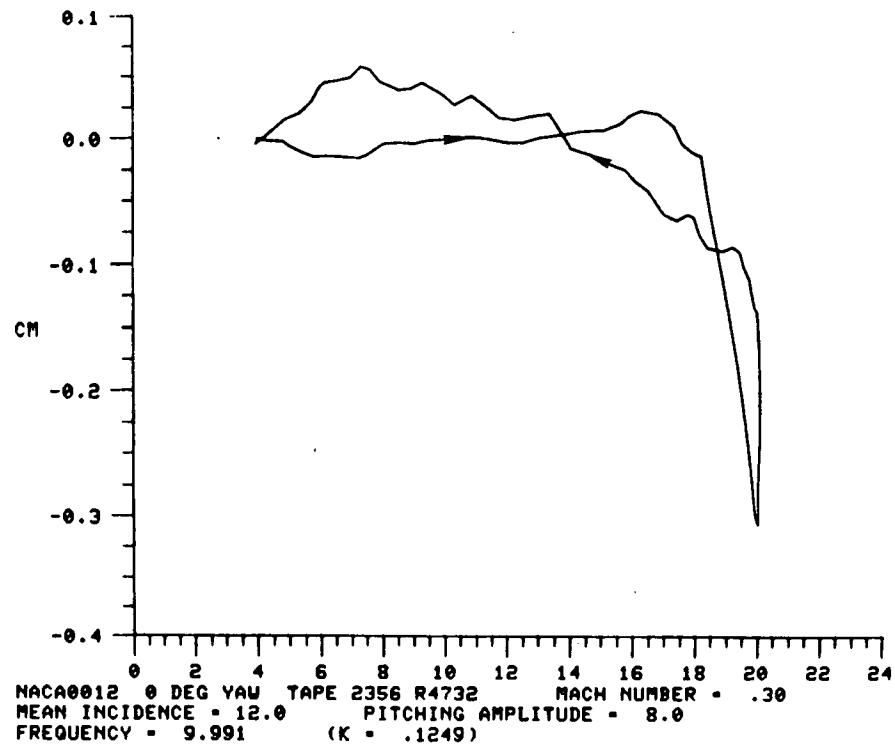
FILE 34. RUN 59.004



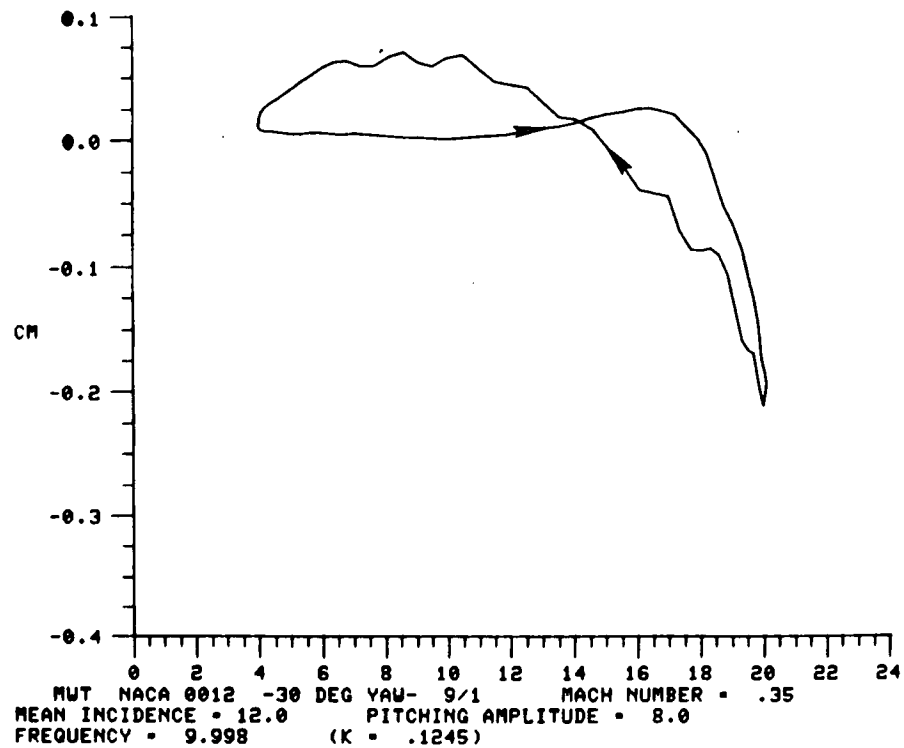
FILE 41. RUN1033.012



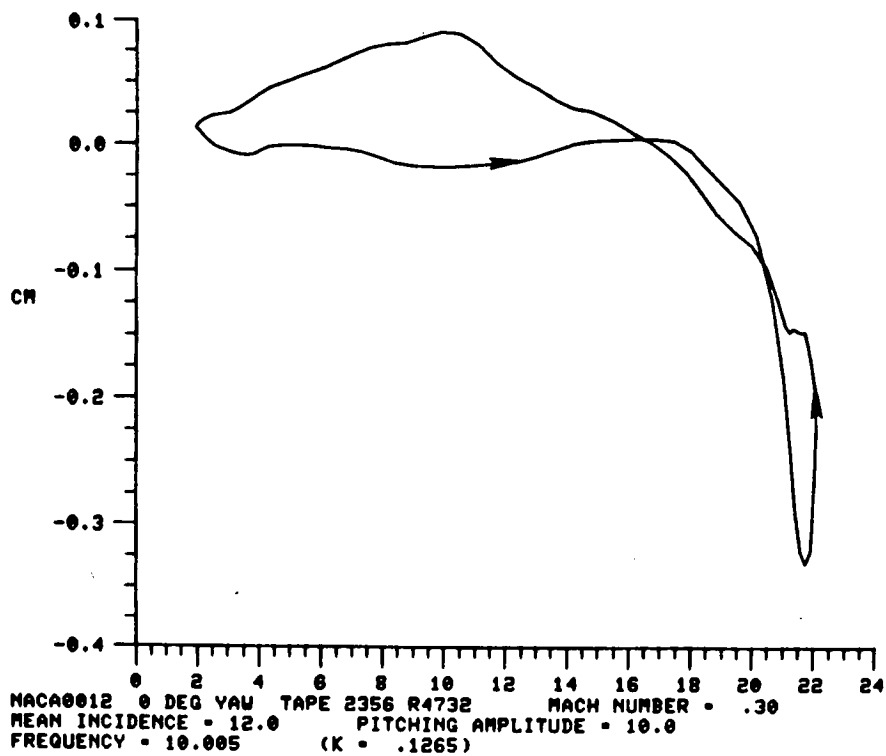
FILE 17. RUN 51.005



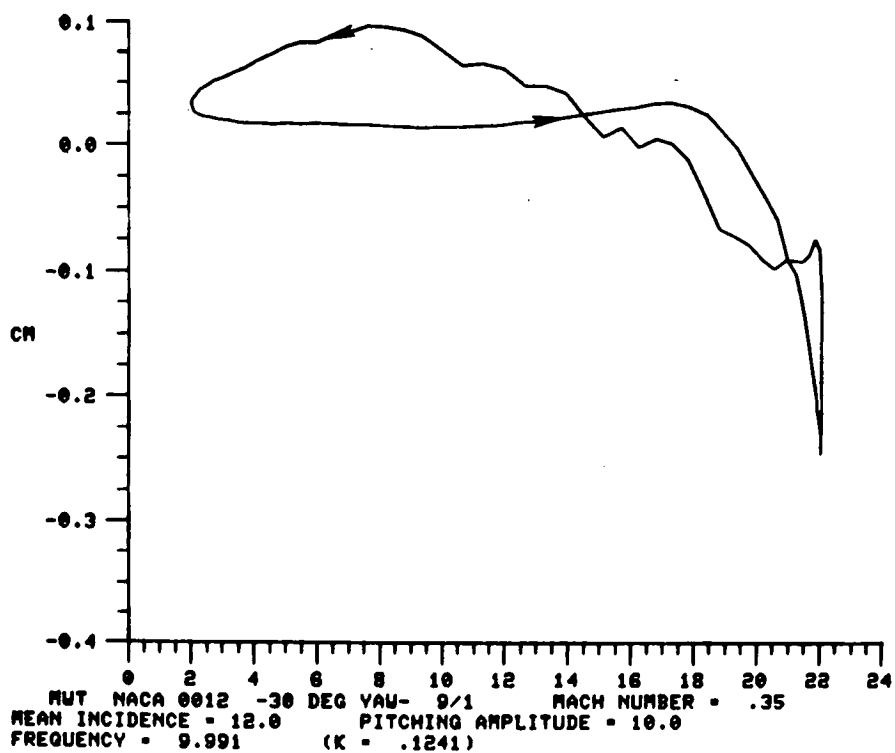
FILE 20. RUN3016.012



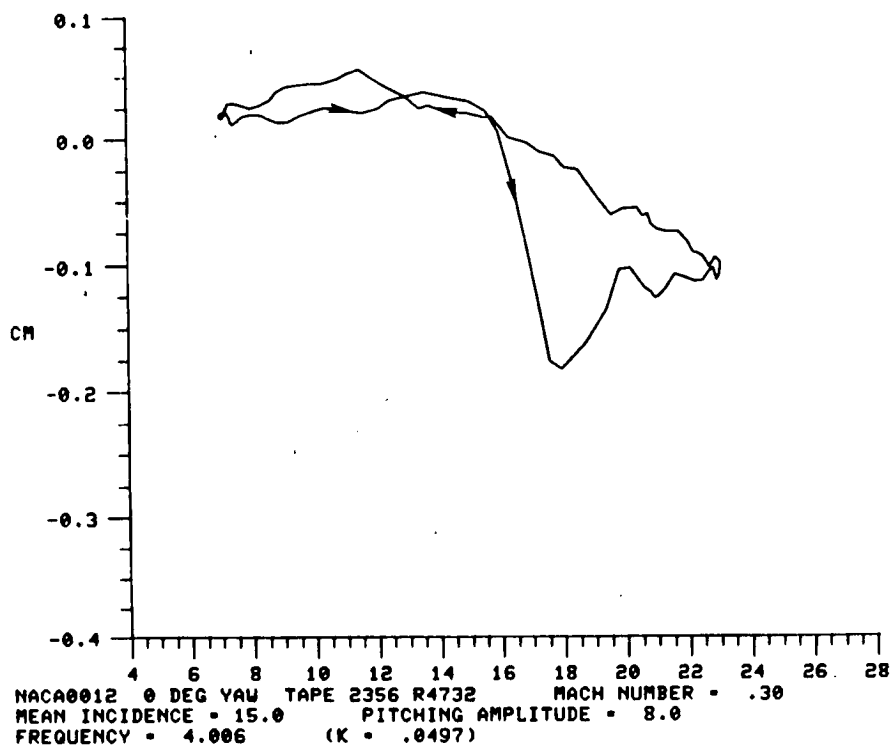
FILE 35. RUN 59.007



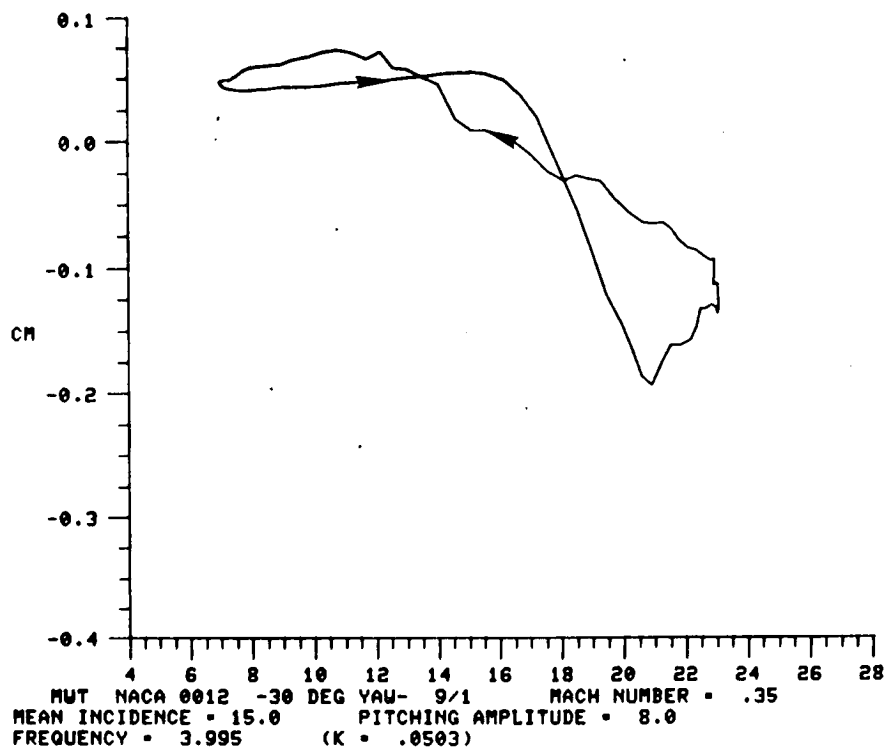
FILE 48. RUN1033.014



FILE 9. RUN 49.001

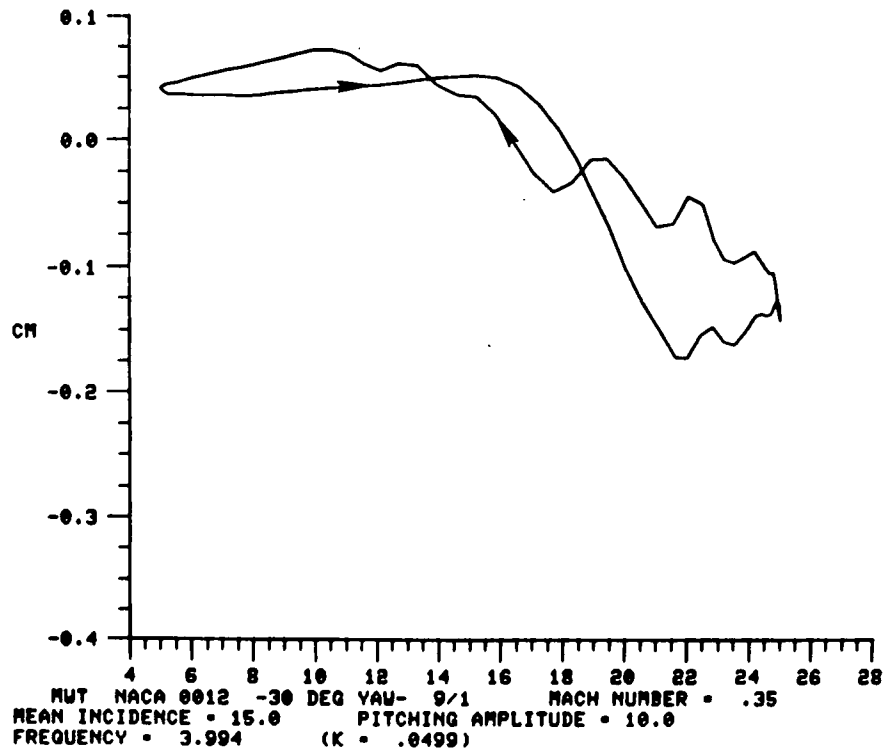


FILE 35. RUN1020.008

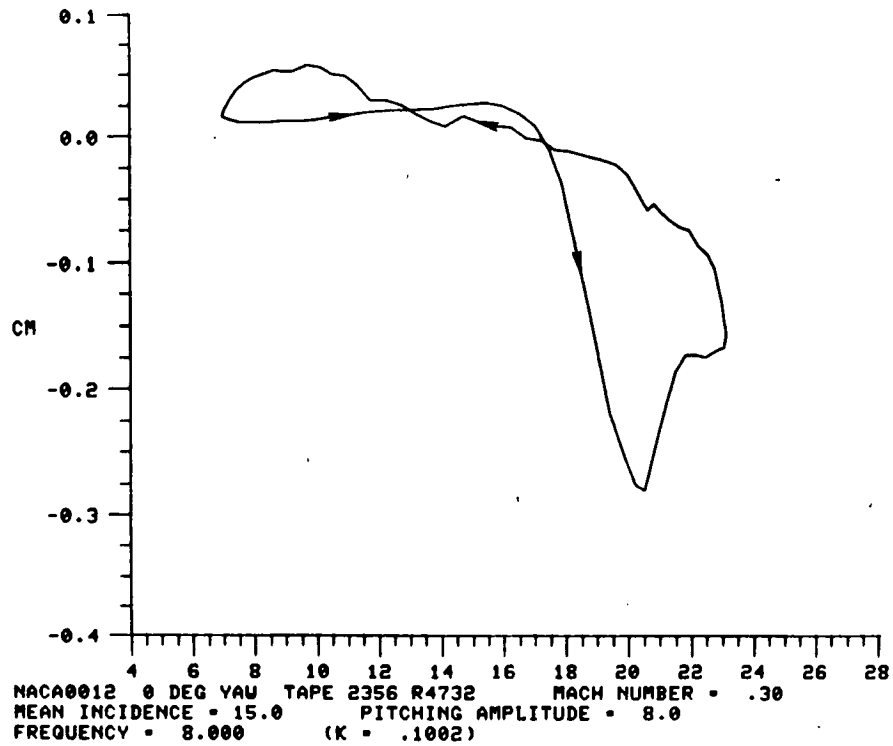


DATA WERE NOT OBTAINED

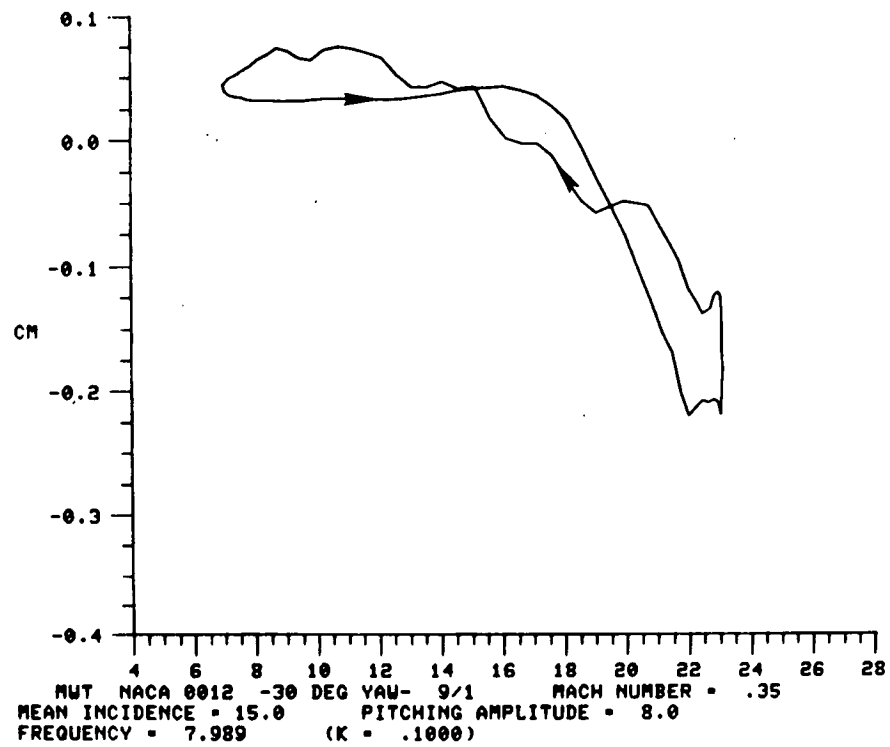
FILE 53. RUN1036.001



FILE 10. RUN 49.003

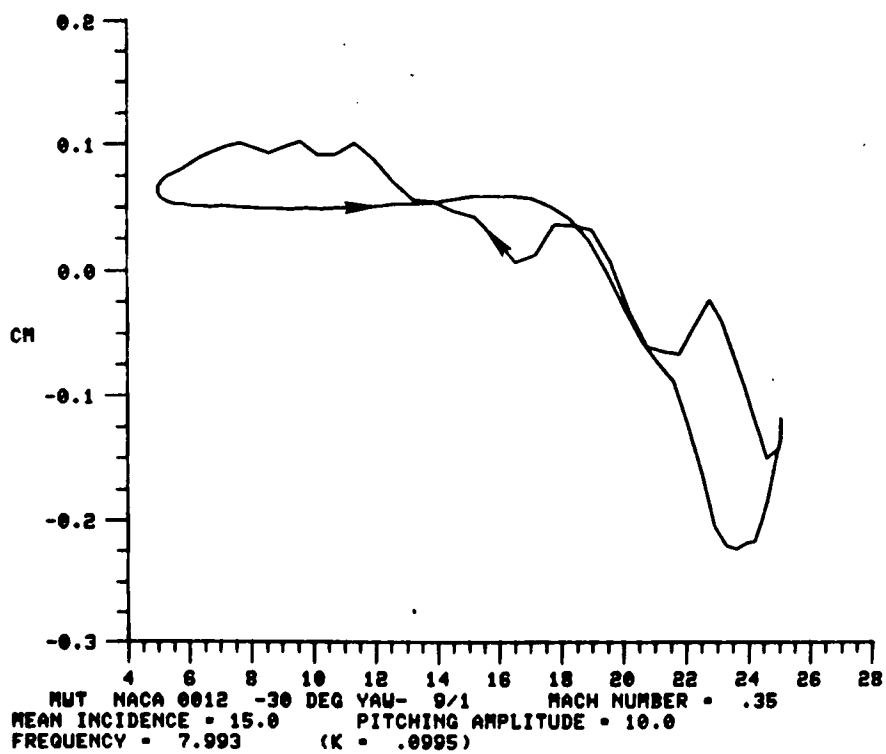


FILE 37. RUN1020.012

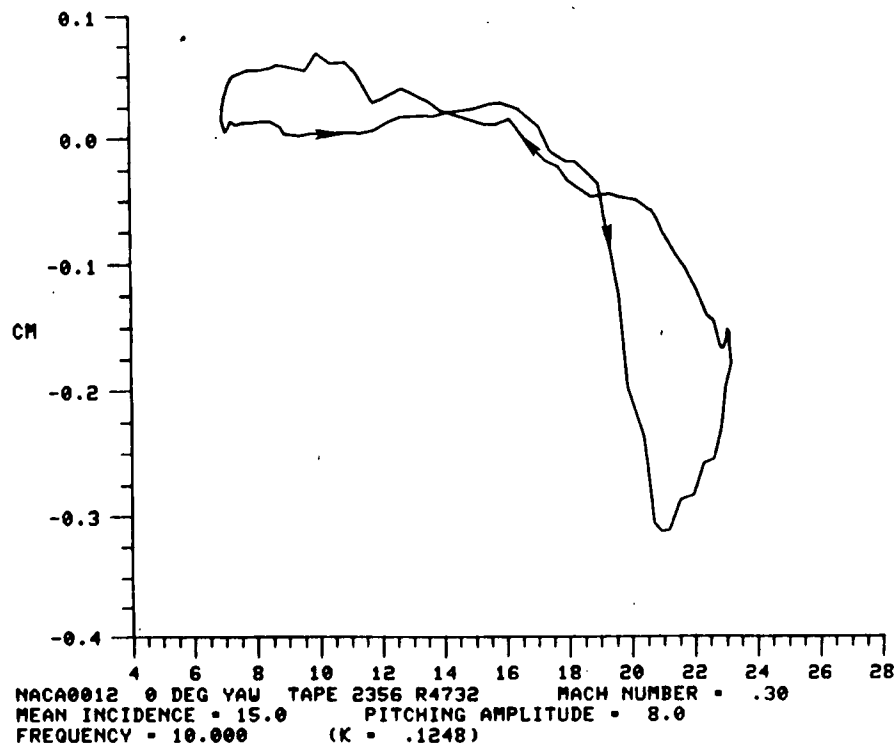


DATA WERE NOT OBTAINED

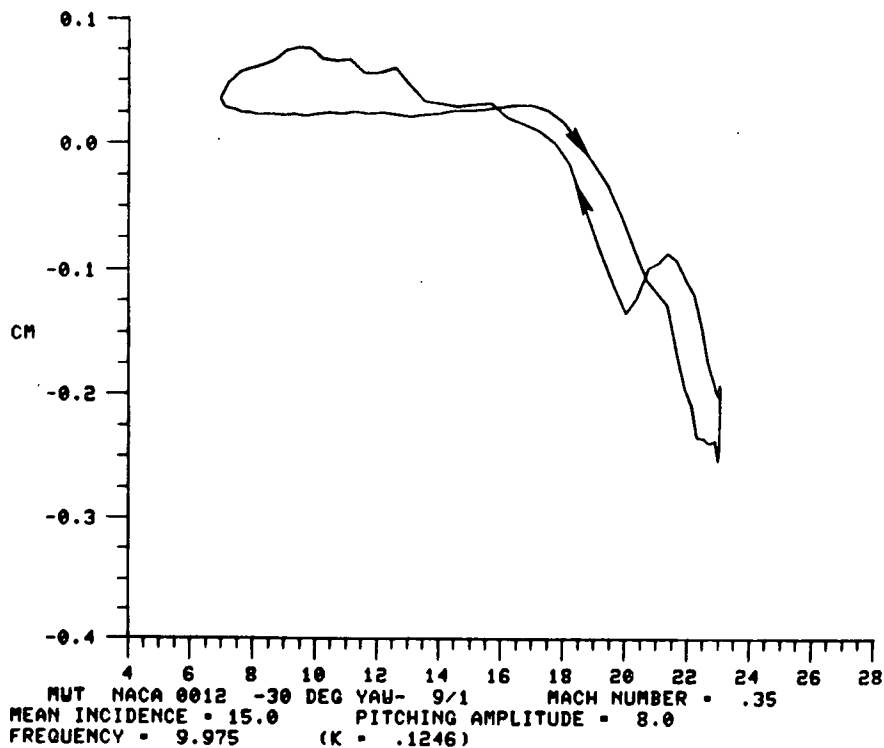
FILE 55. RUN1036.005



FILE 11. RUN 49.005

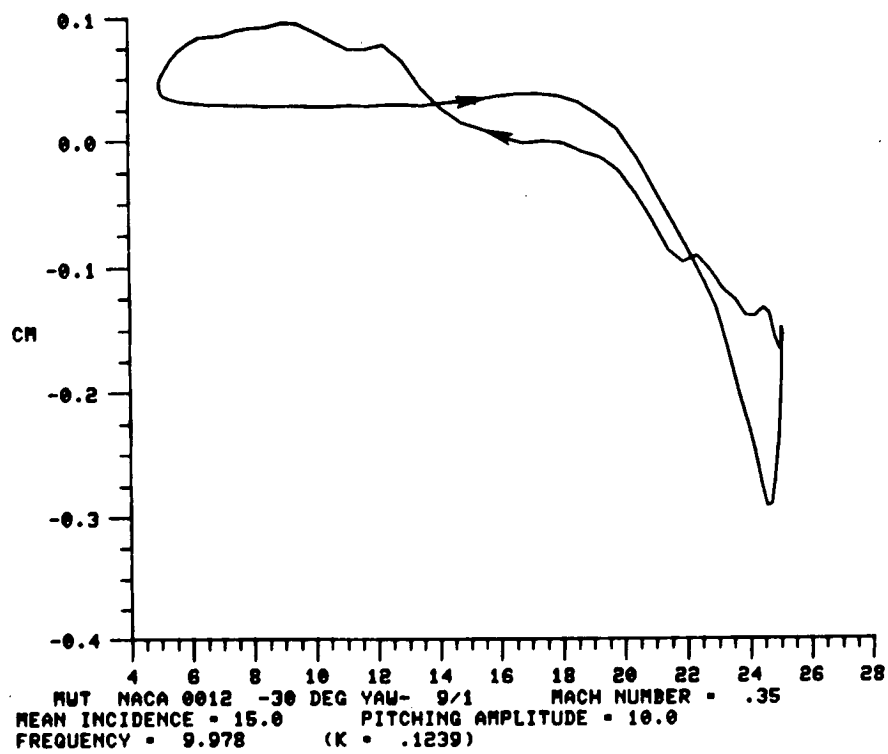


FILE 38. RUN1020.014

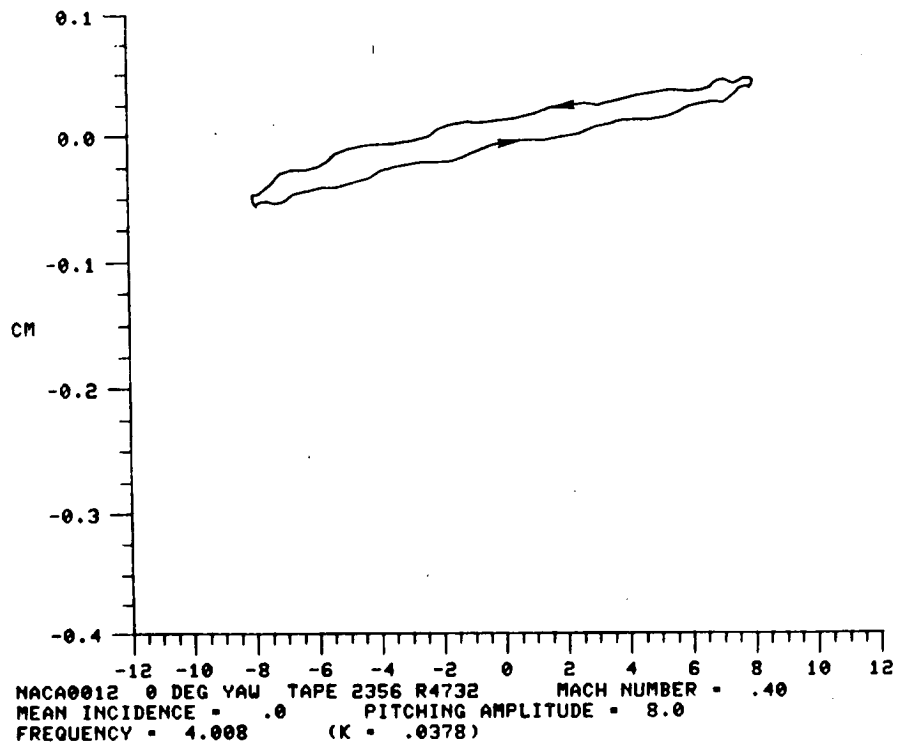


DATA WERE NOT OBTAINED

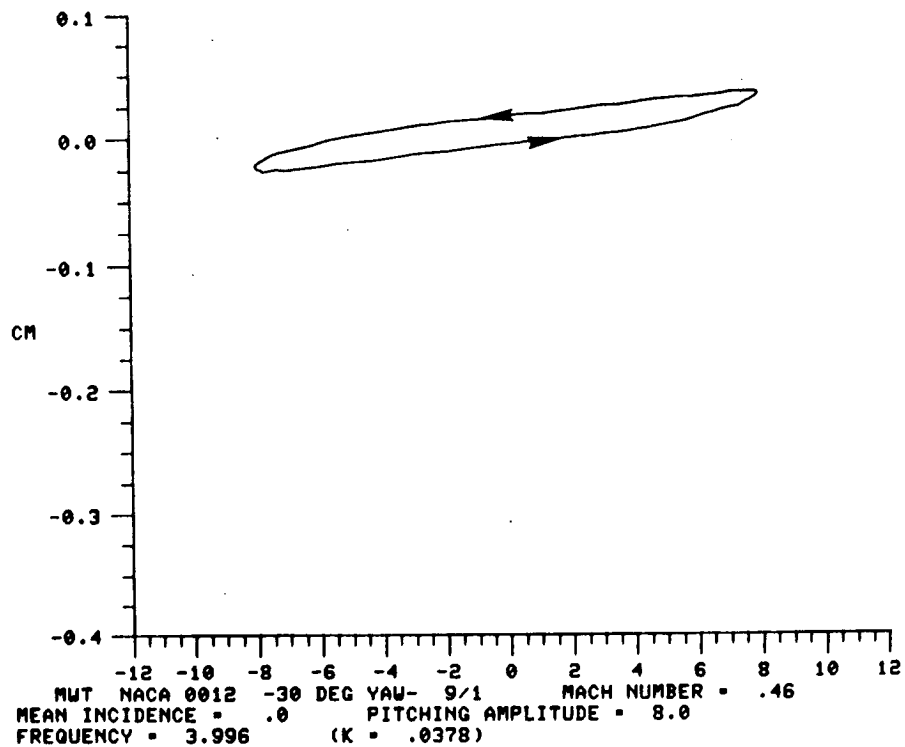
FILE 56. RUN1036.007



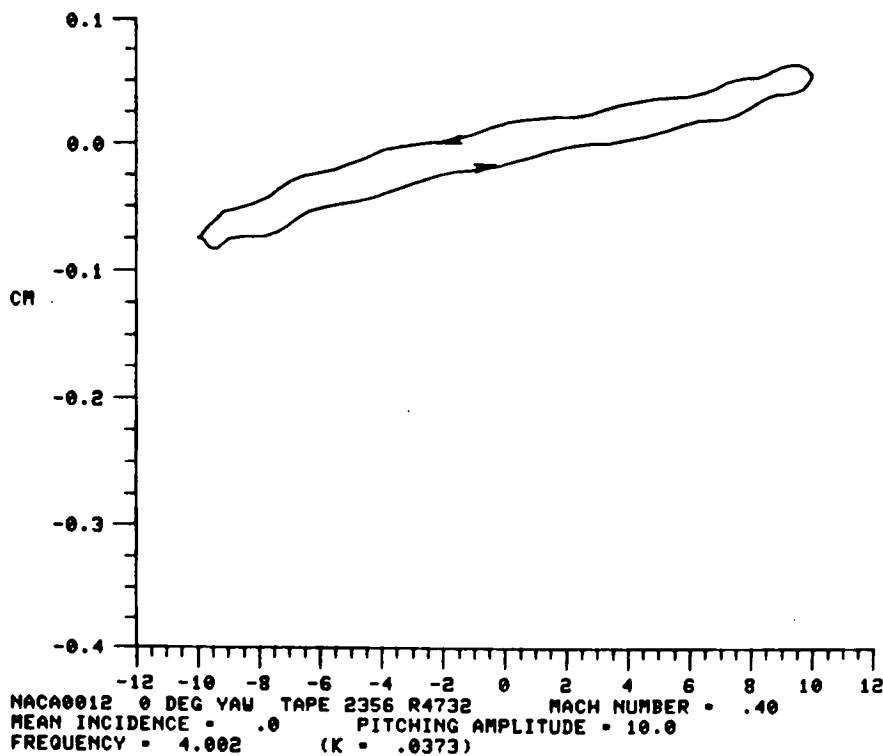
FILE 24. RUN 54.001



FILE 12. RUN1008.001

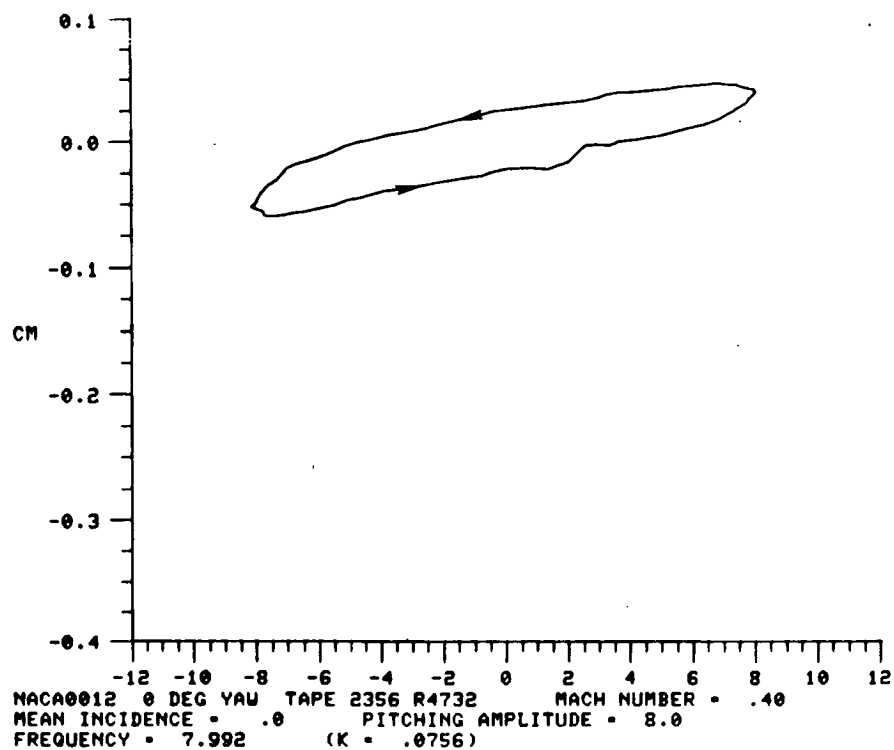


FILE 30. RUN 58.001

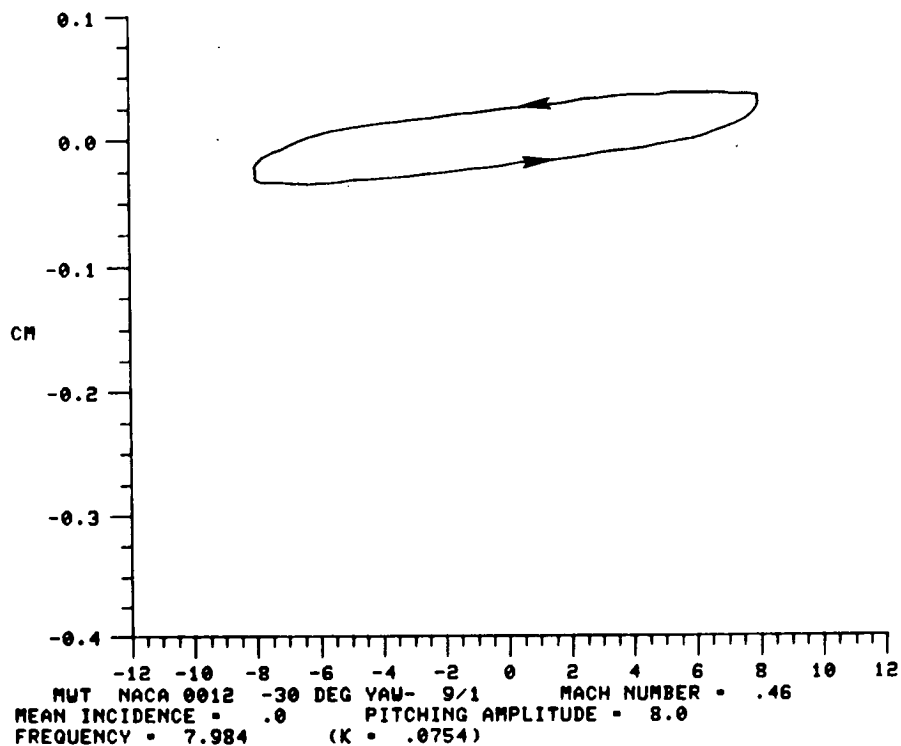


DATA WERE NOT OBTAINED

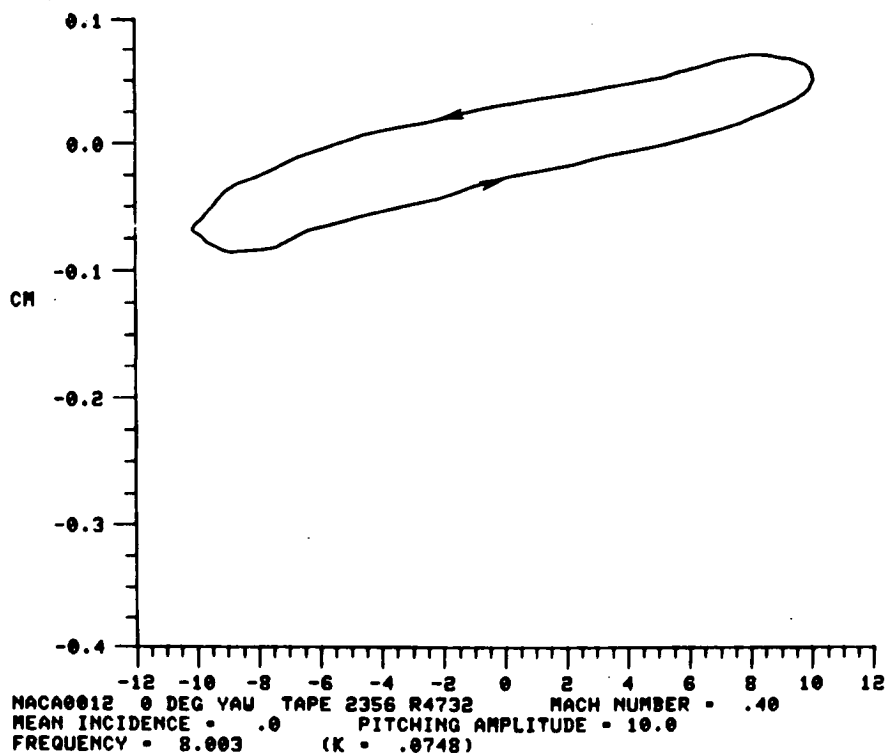
FILE 25. RUN 54.003



FILE 14. RUN1008.005

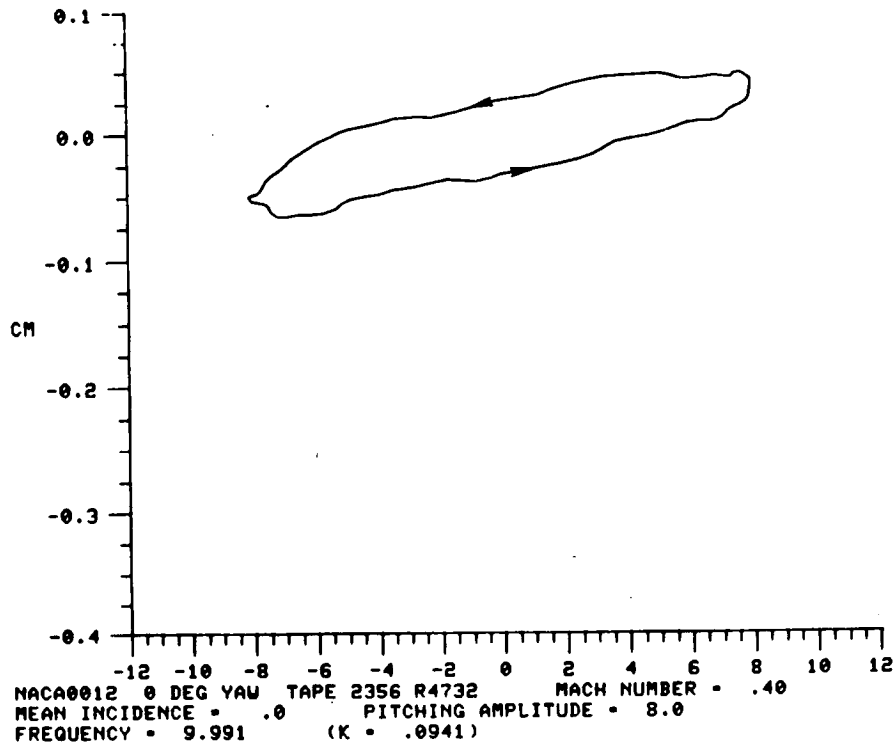


FILE 31. RUN 58.003

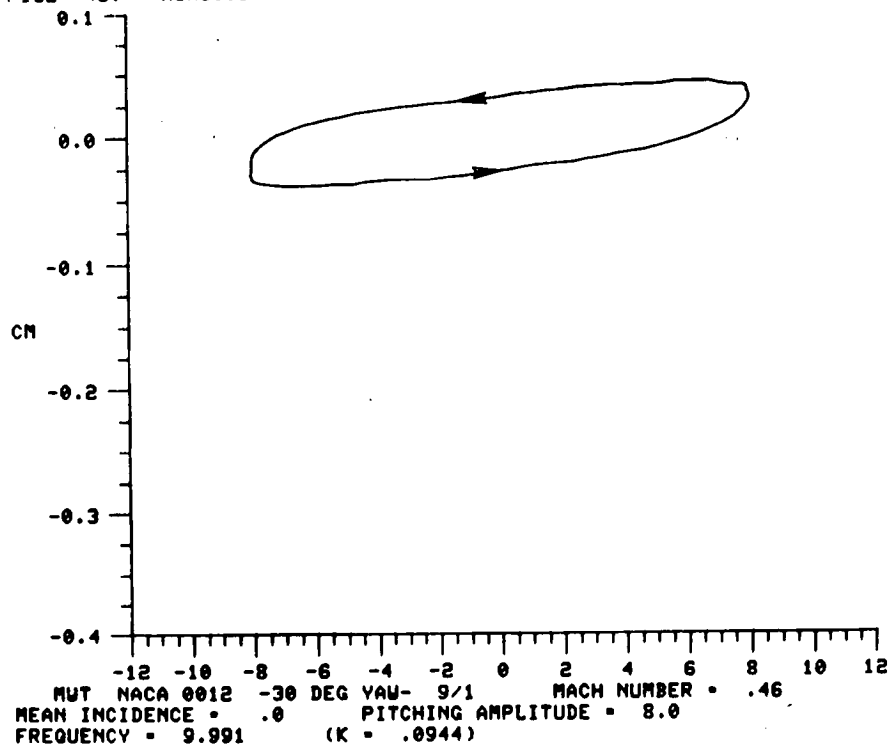


DATA WERE NOT OBTAINED

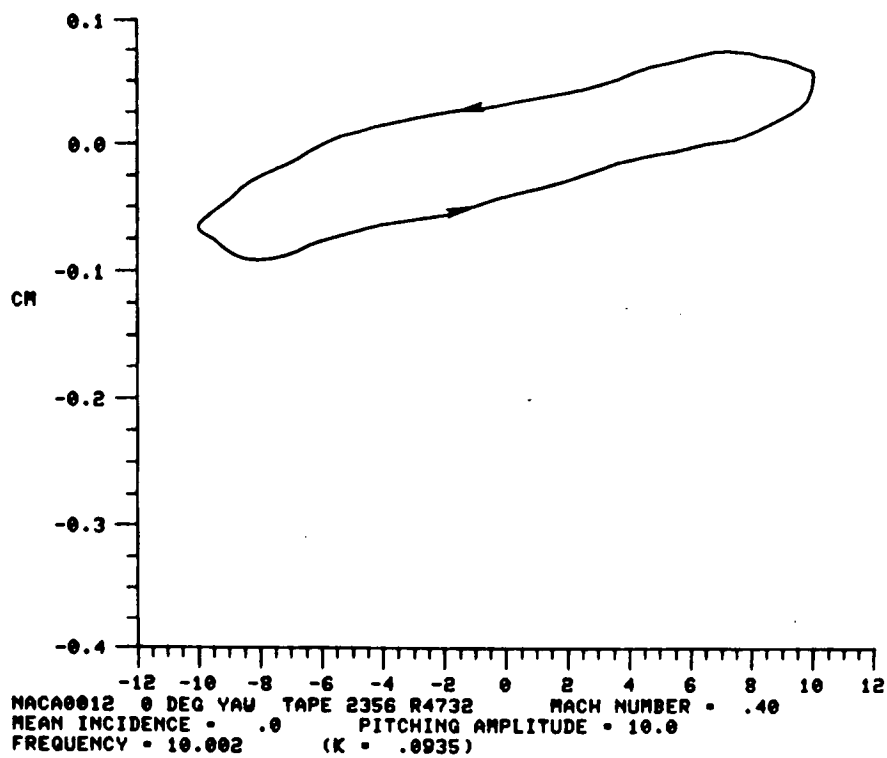
FILE 26. RUN 54.005



FILE 48. RUN1008.007

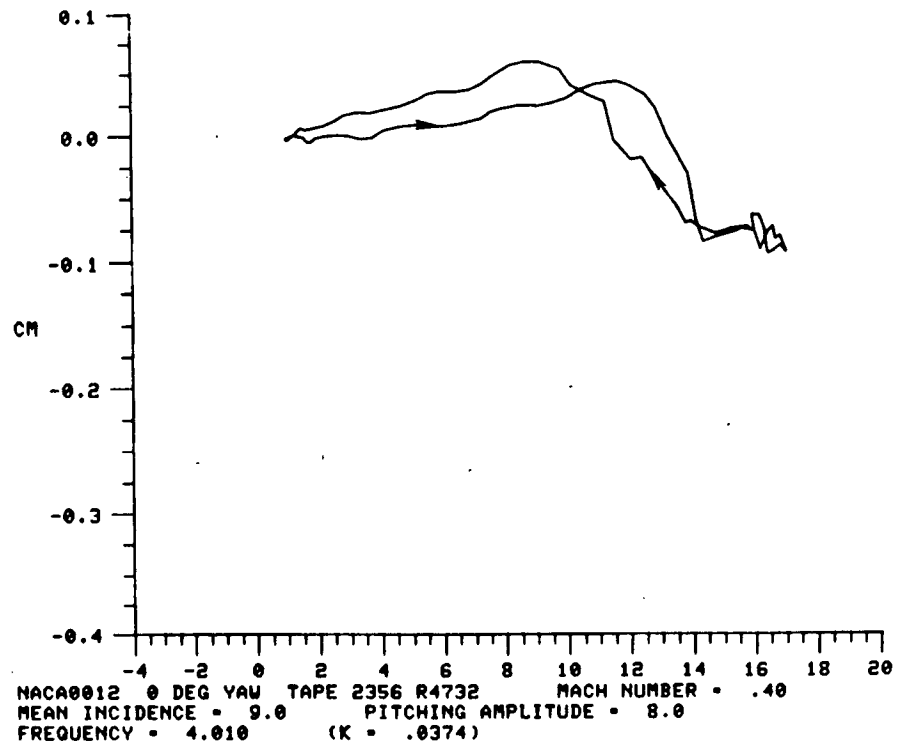


FILE 32. RUN 58.005

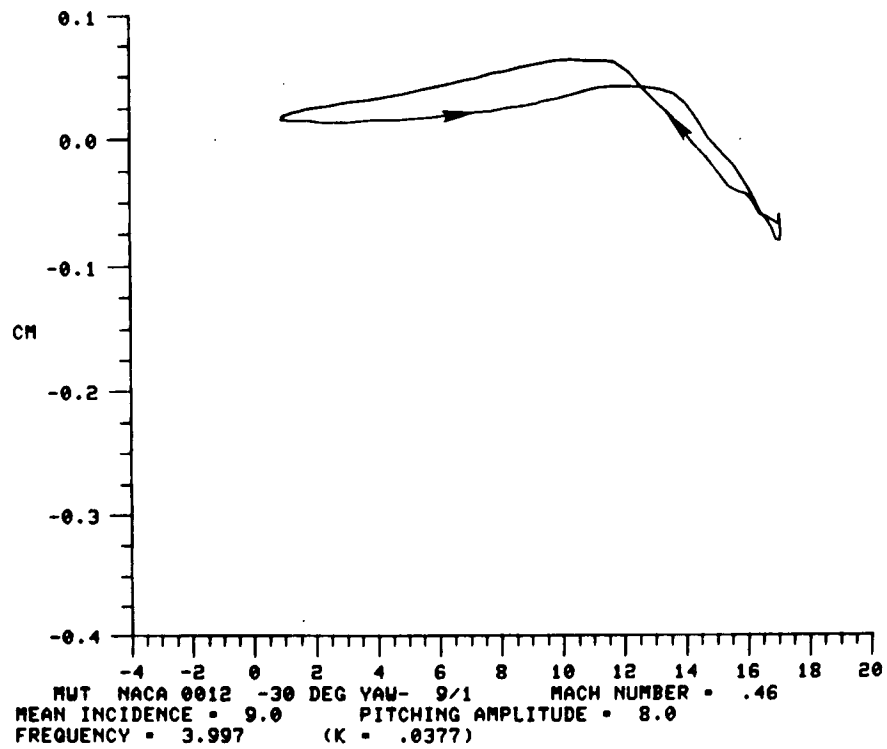


DATA WERE NOT OBTAINED

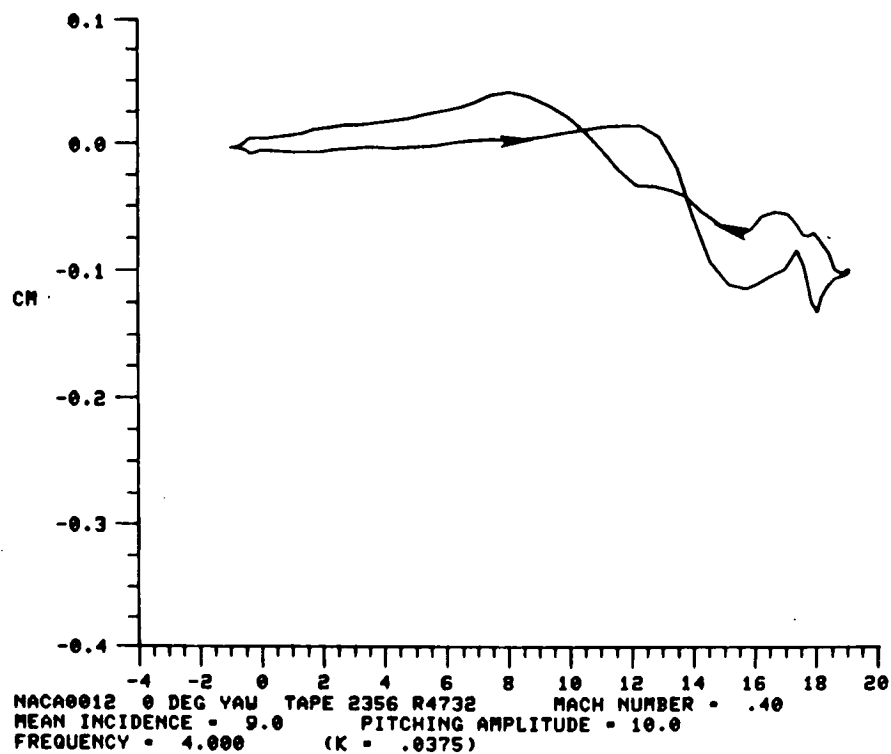
FILE 6. RUN 48.001



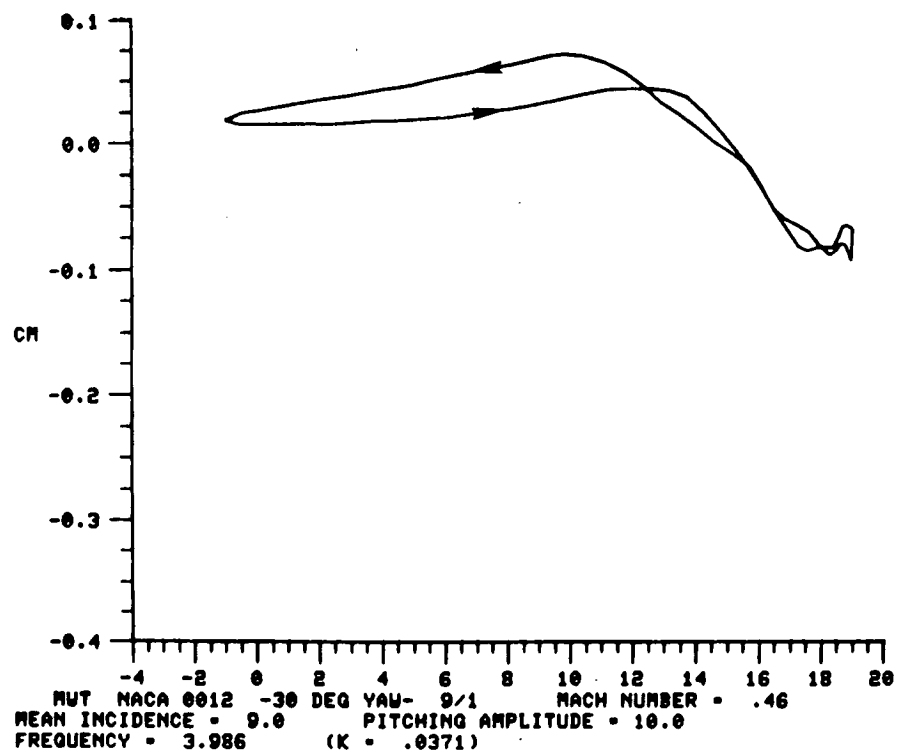
FILE 30. RUN1019.001



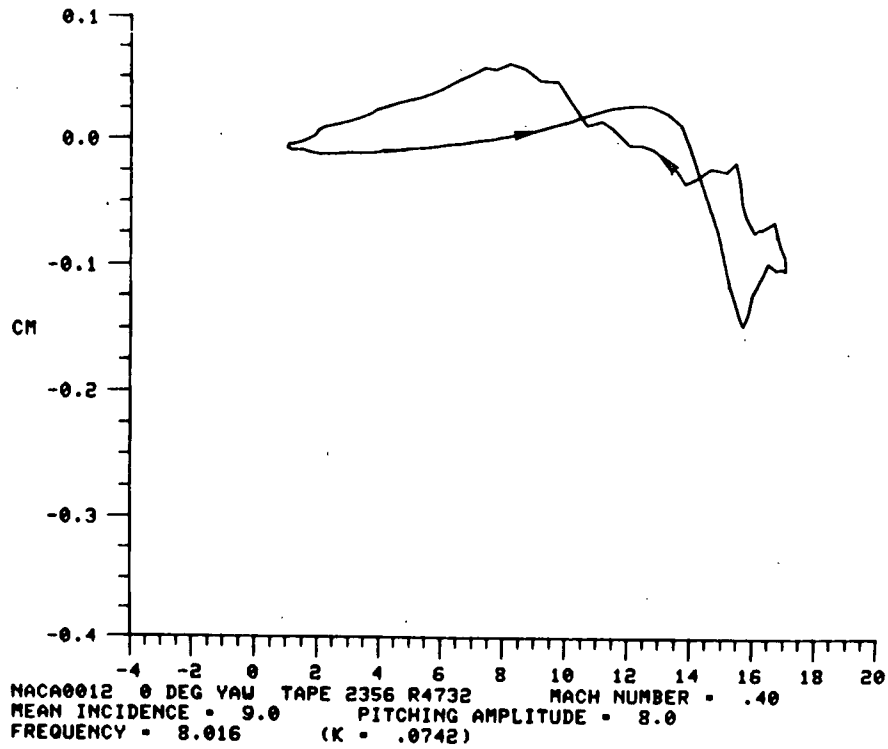
FILE 42. RUN 62.002



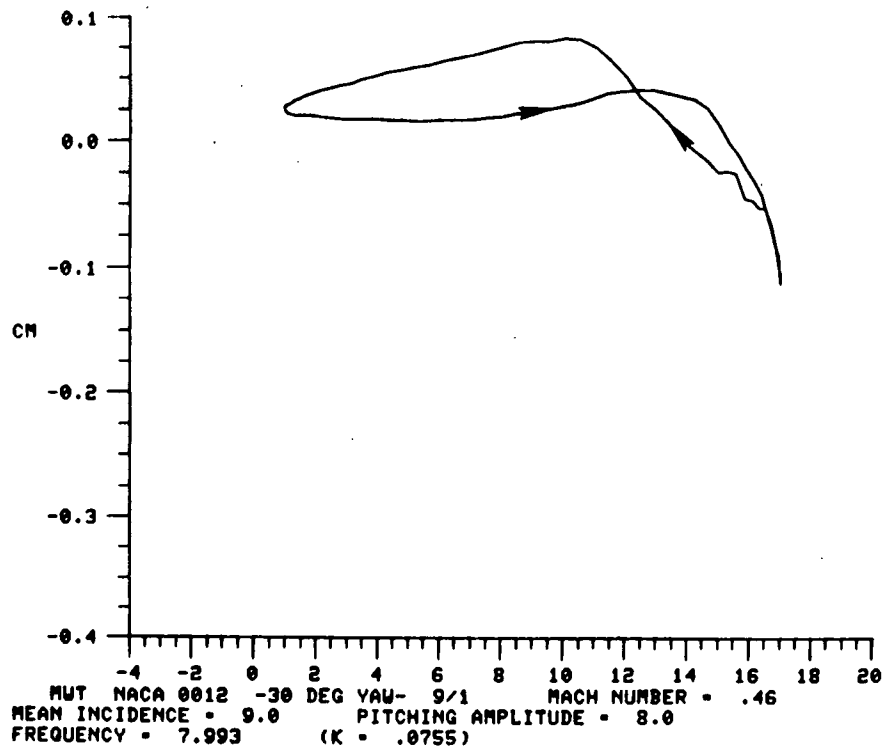
FILE 10. RUN3030.001



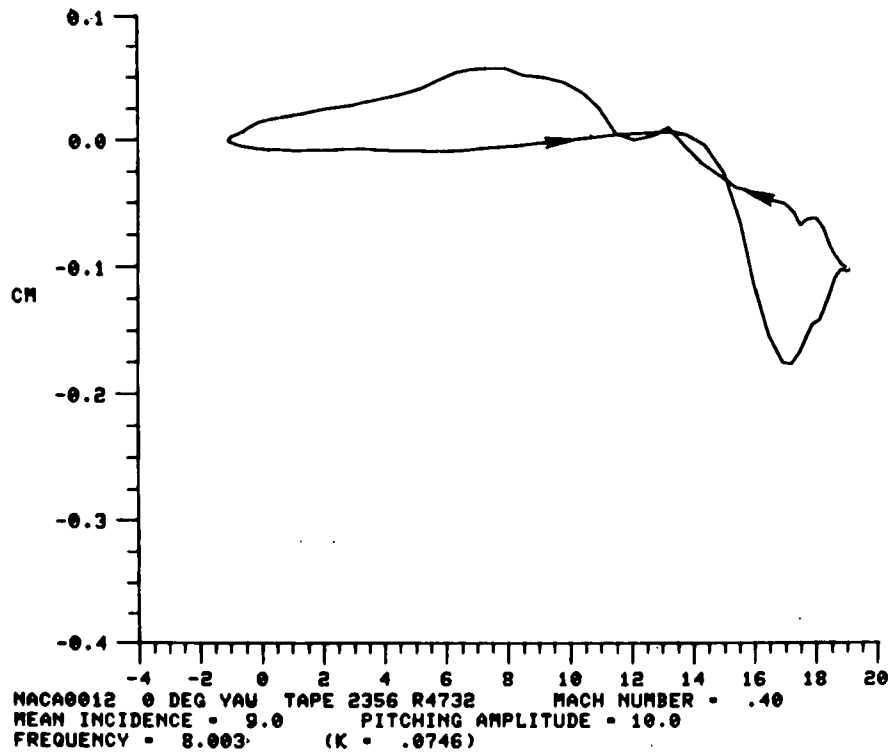
FILE 7. RUN 48.003



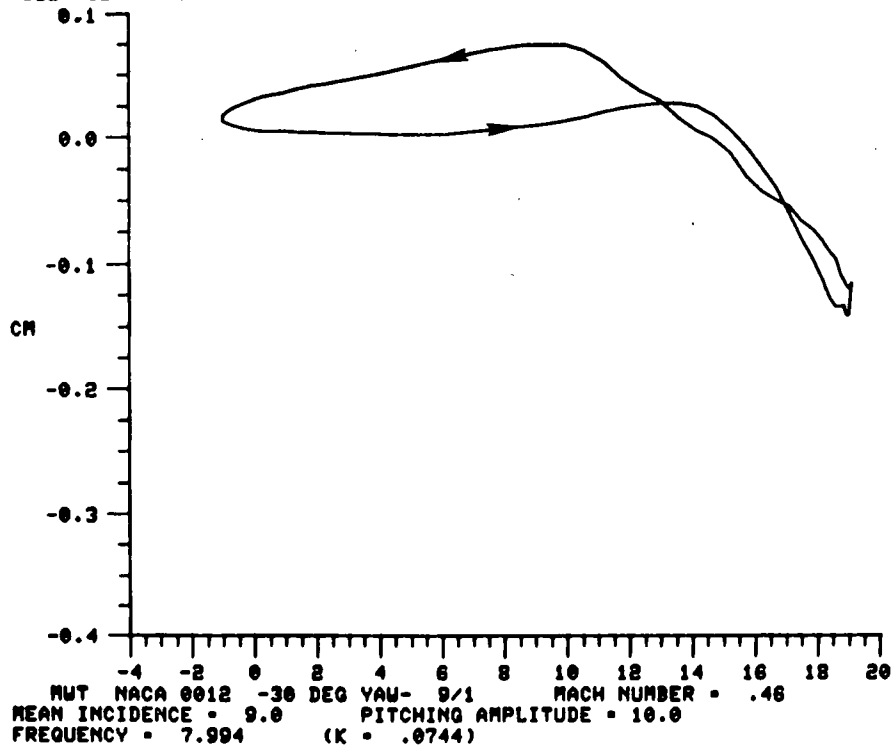
FILE 32. RUN1019.005



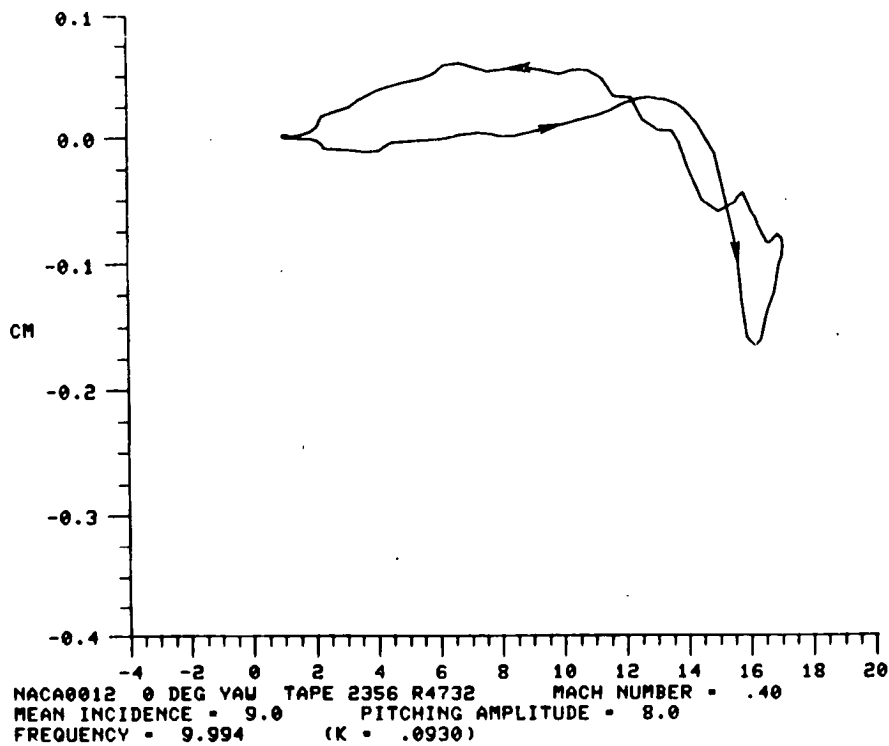
FILE 43. RUN 62.004



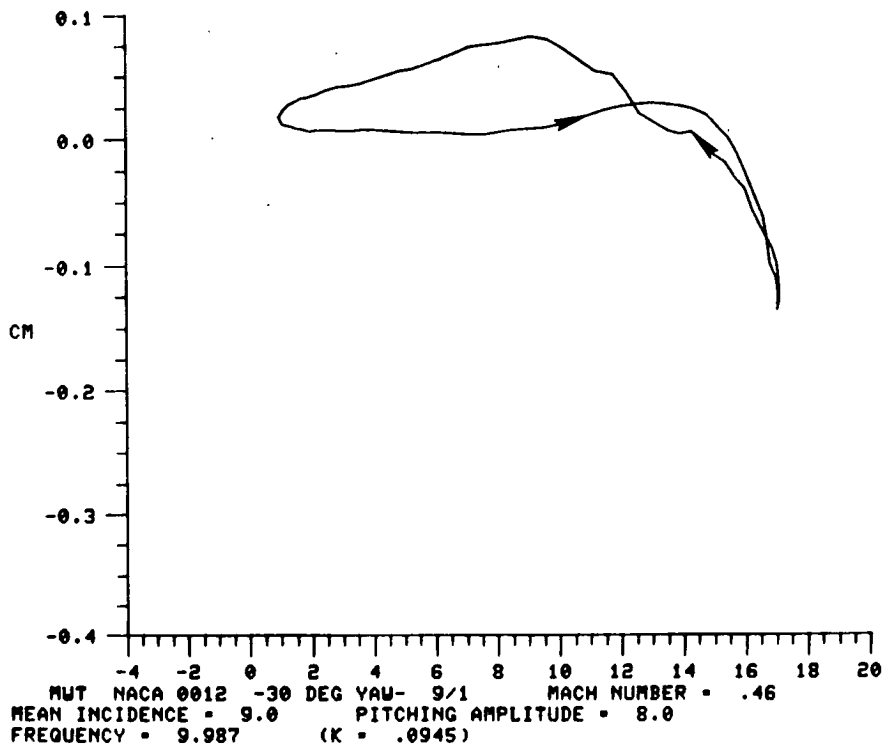
FILE 12. RUN1030.005



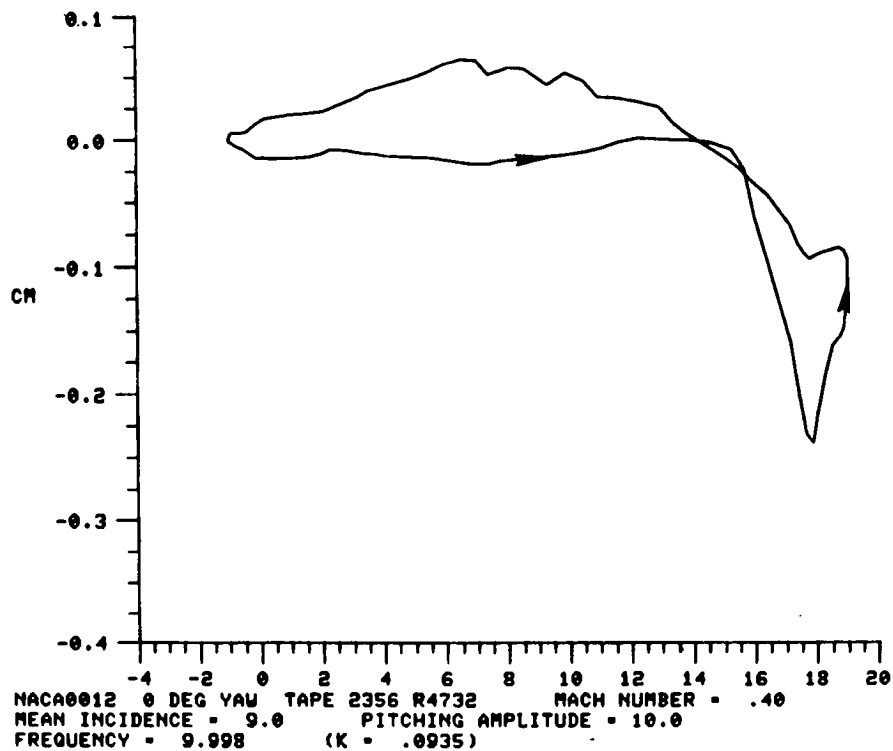
FILE 8. RUN 48.005



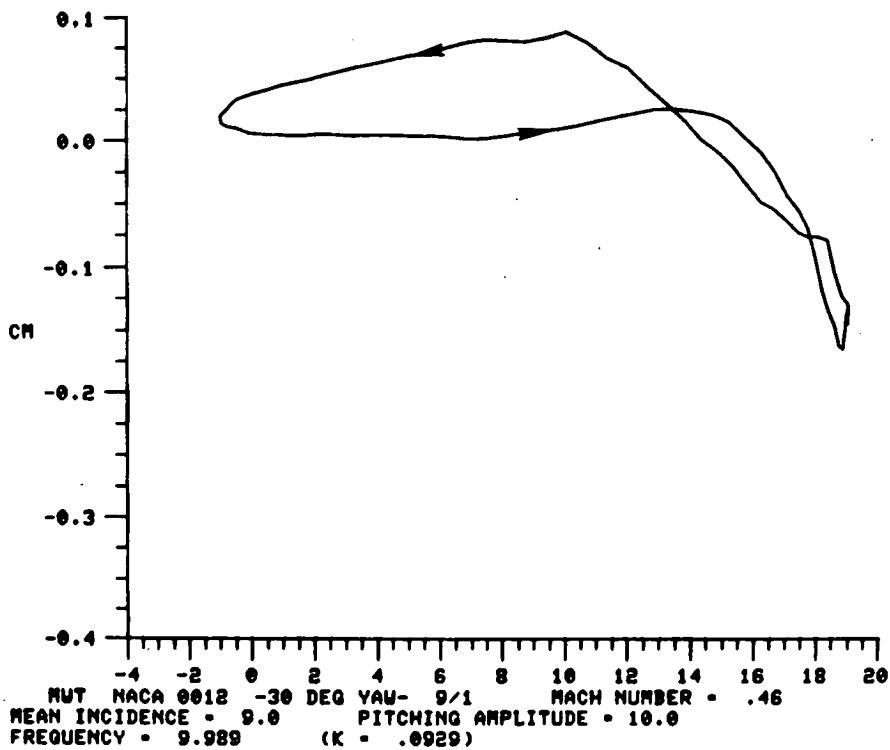
FILE 33. RUN1019.007



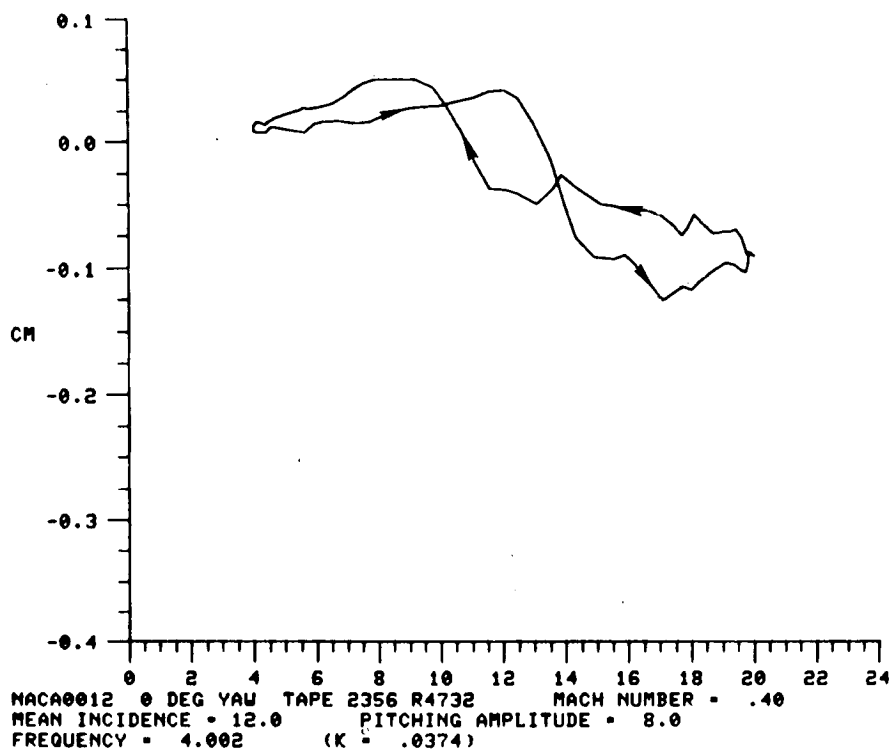
FILE 44. RUN 62.006



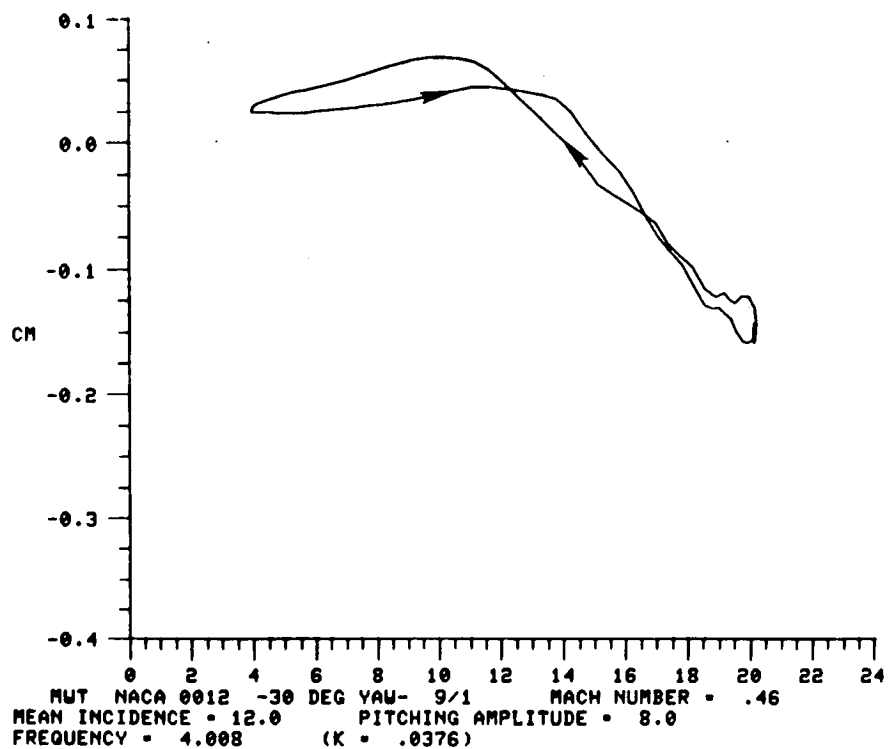
FILE 13. RUN1030.007



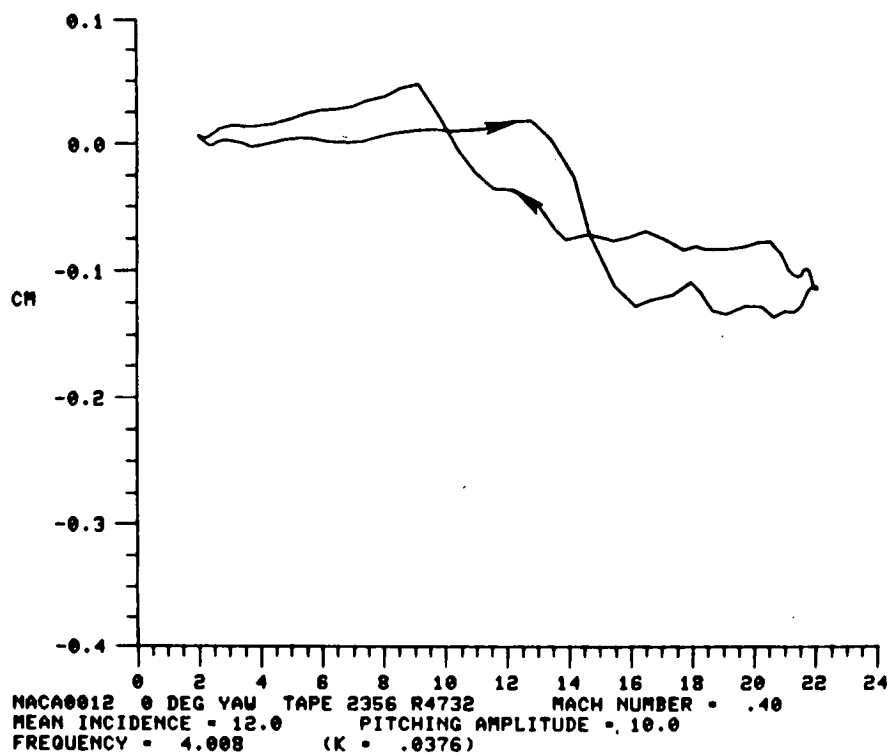
FILE 18. RUN 52.001



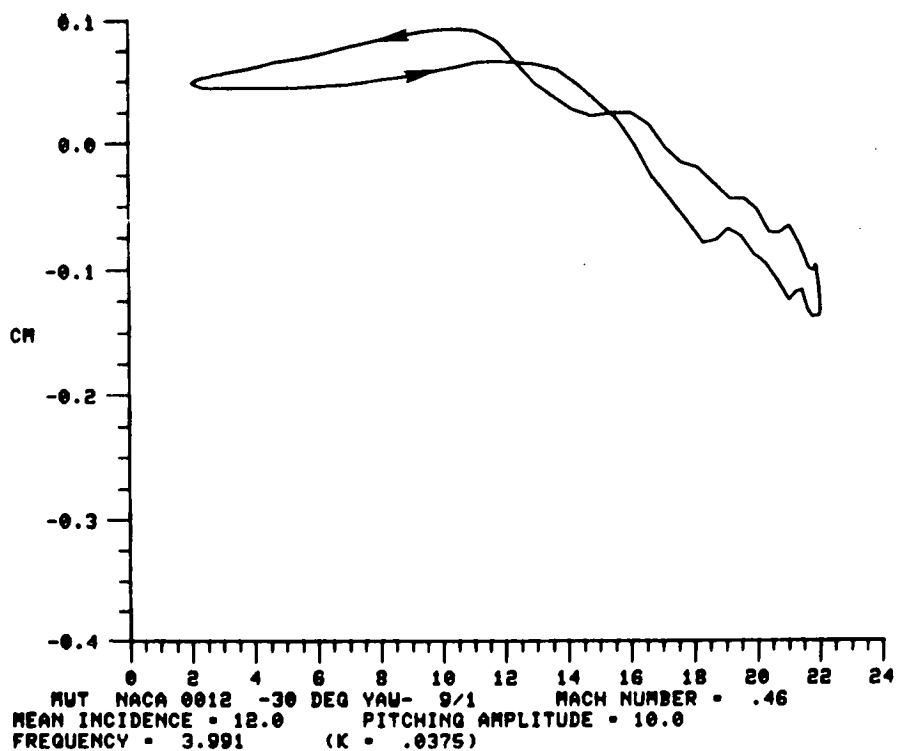
FILE 55. RUN1017.001



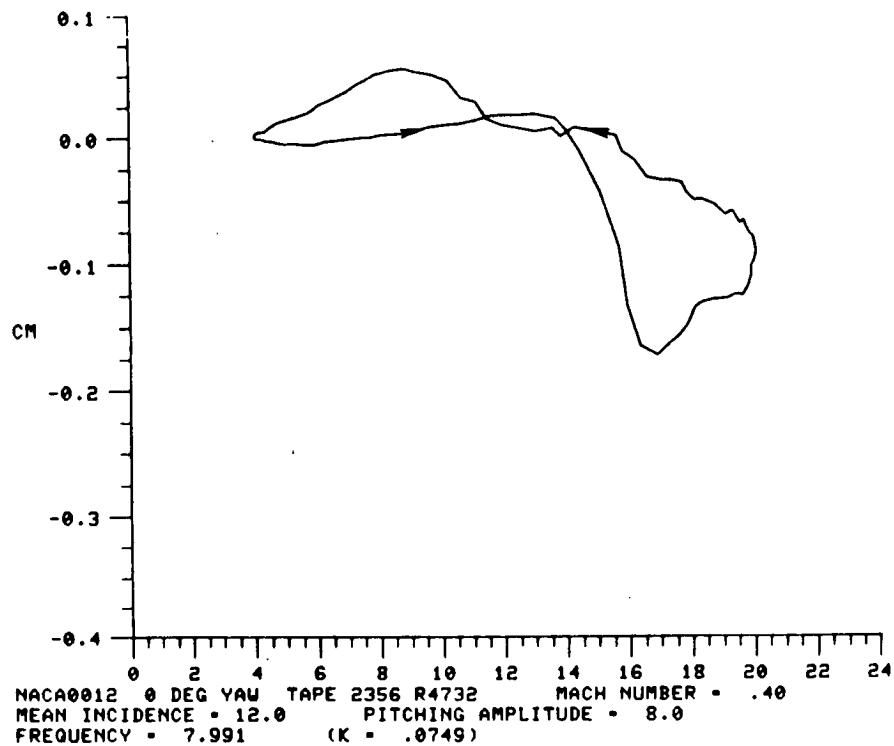
FILE 38. RUN 60.001



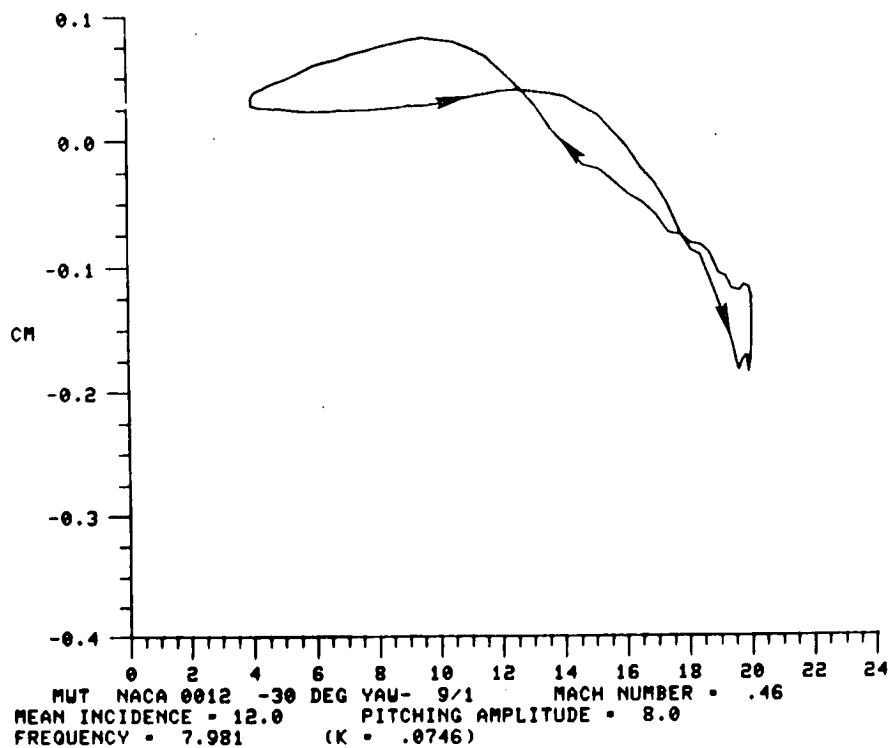
FILE 43. RUN1034.001



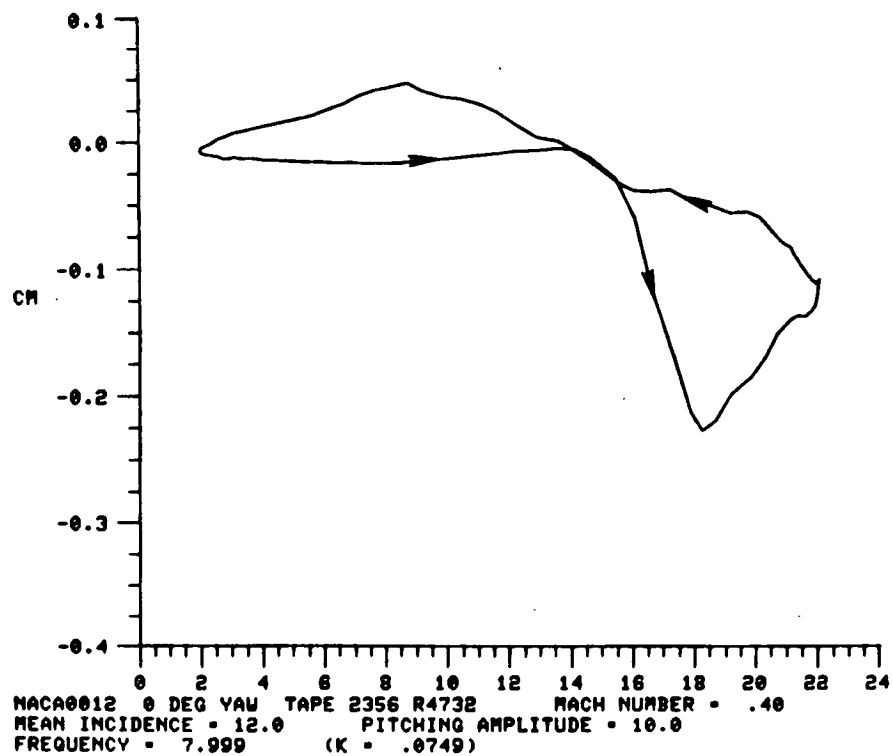
FILE 19. RUN 52.003



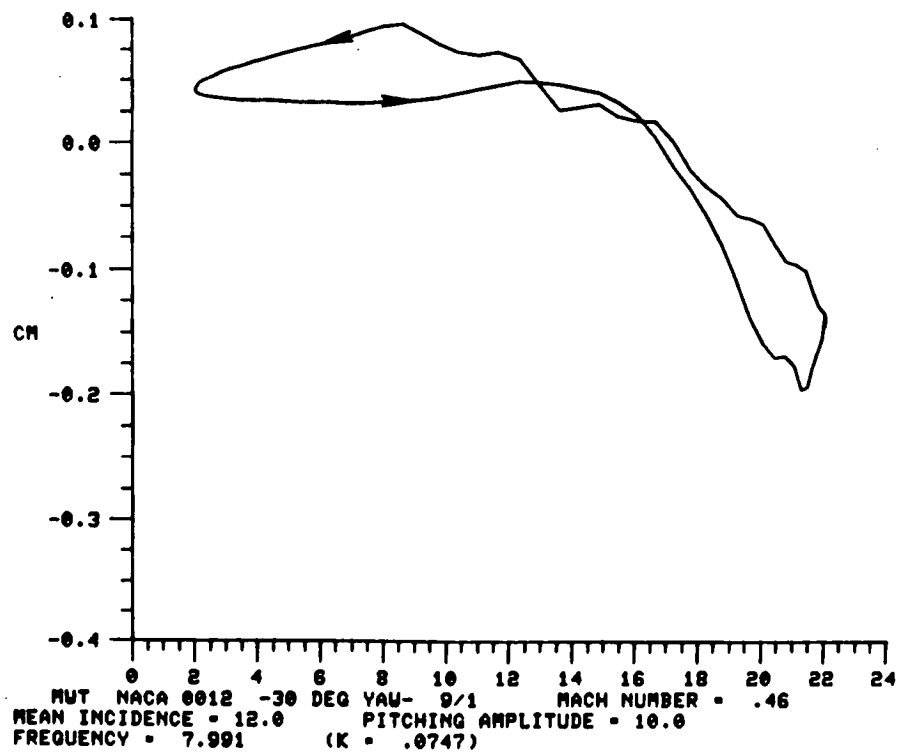
FILE 57. RUN1017.005



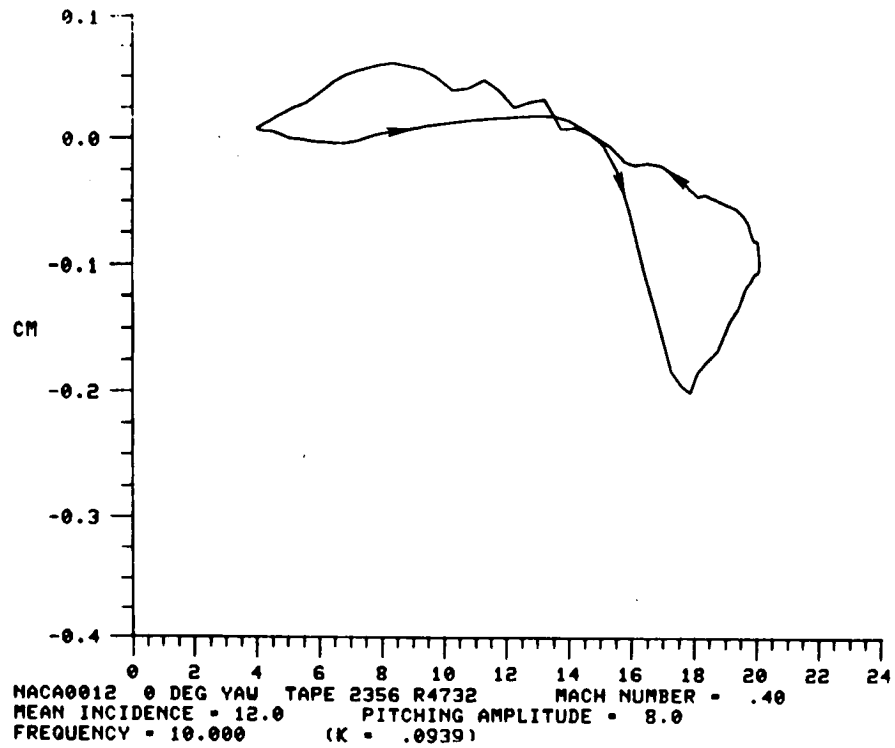
FILE 37. RUN 60.003



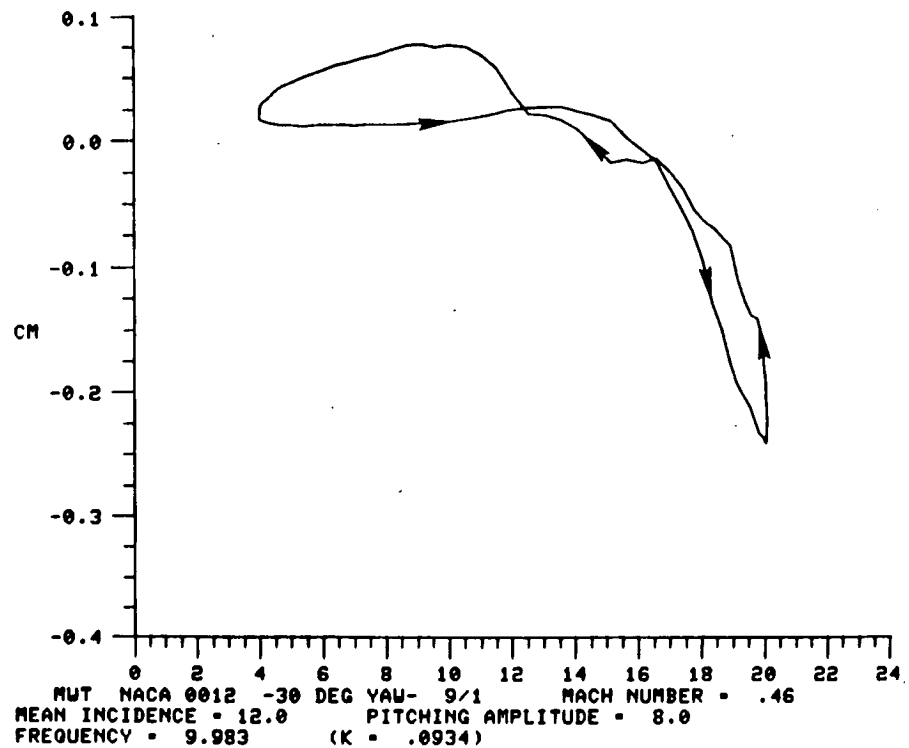
FILE 45. RUN1034.005



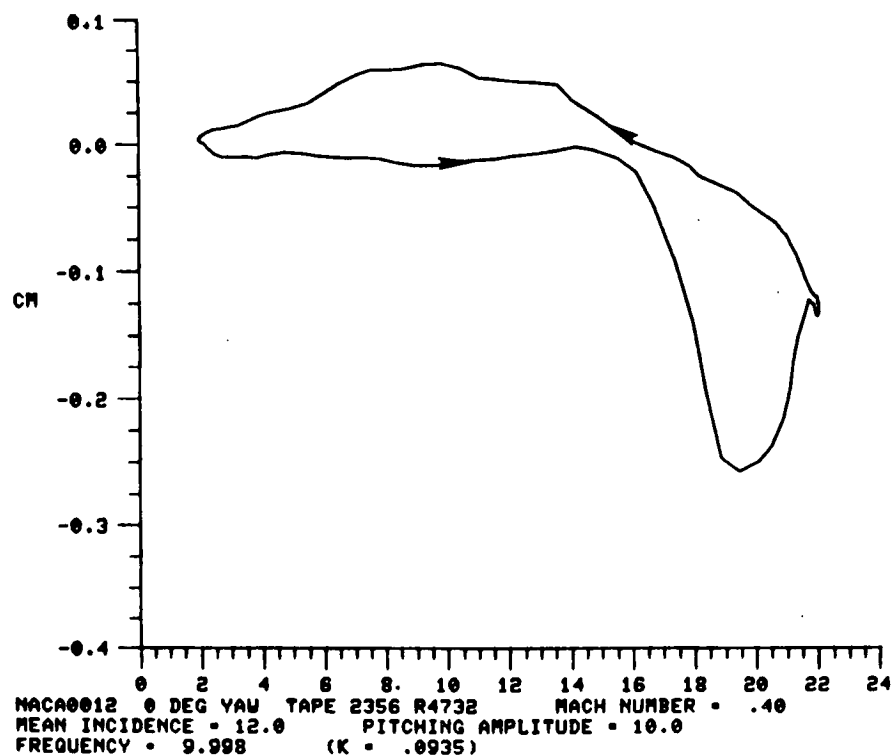
FILE 20. RUN 52.005



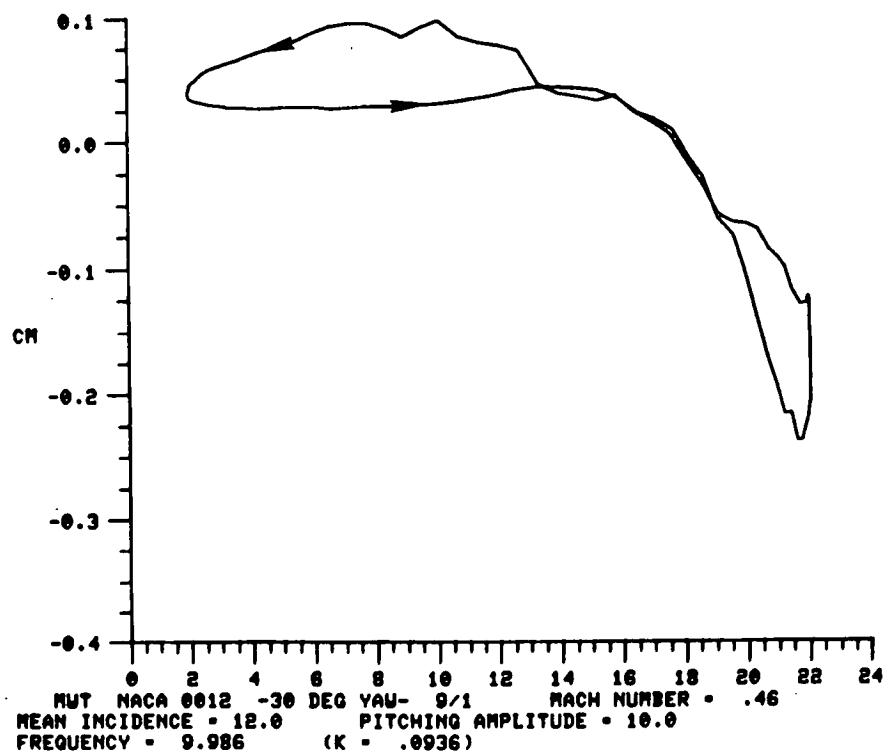
FILE 21. RUN3017.007



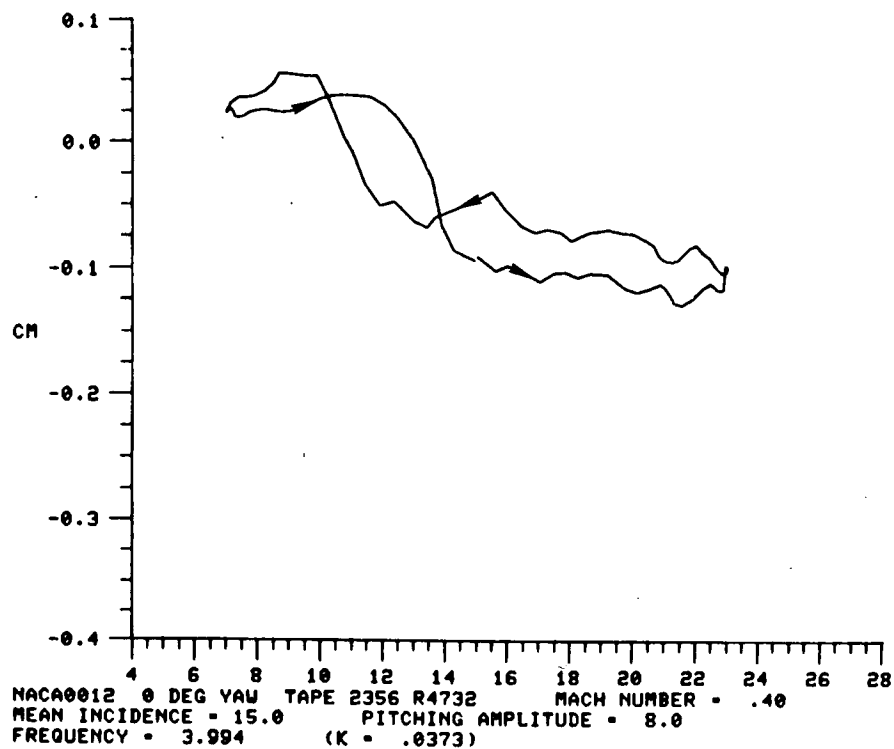
FILE 38. RUN 60.005



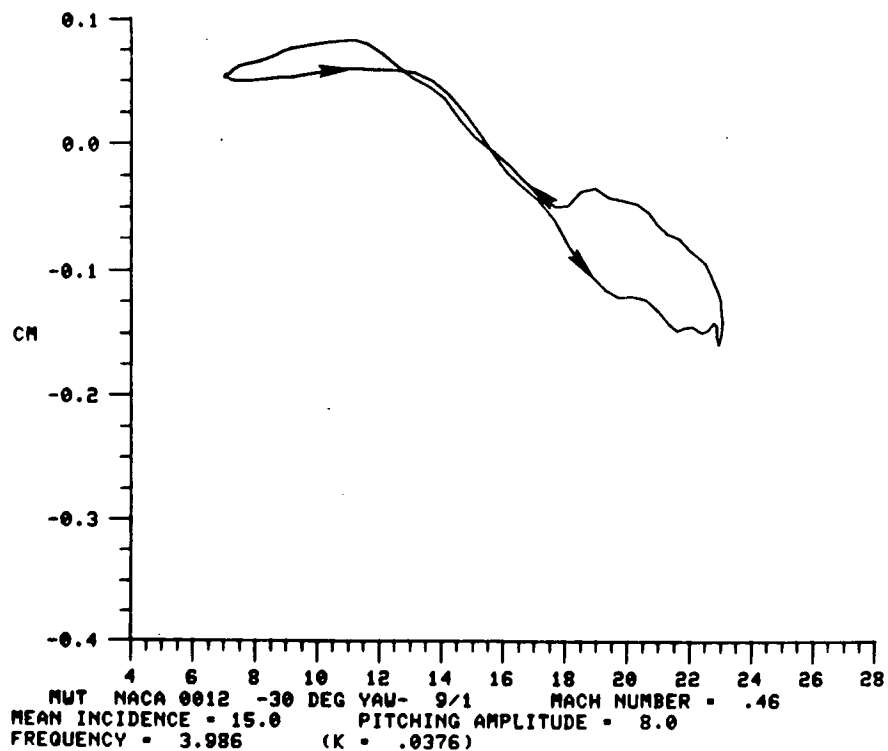
FILE 46. RUN1034.007



FILE 12. RUN 50.001

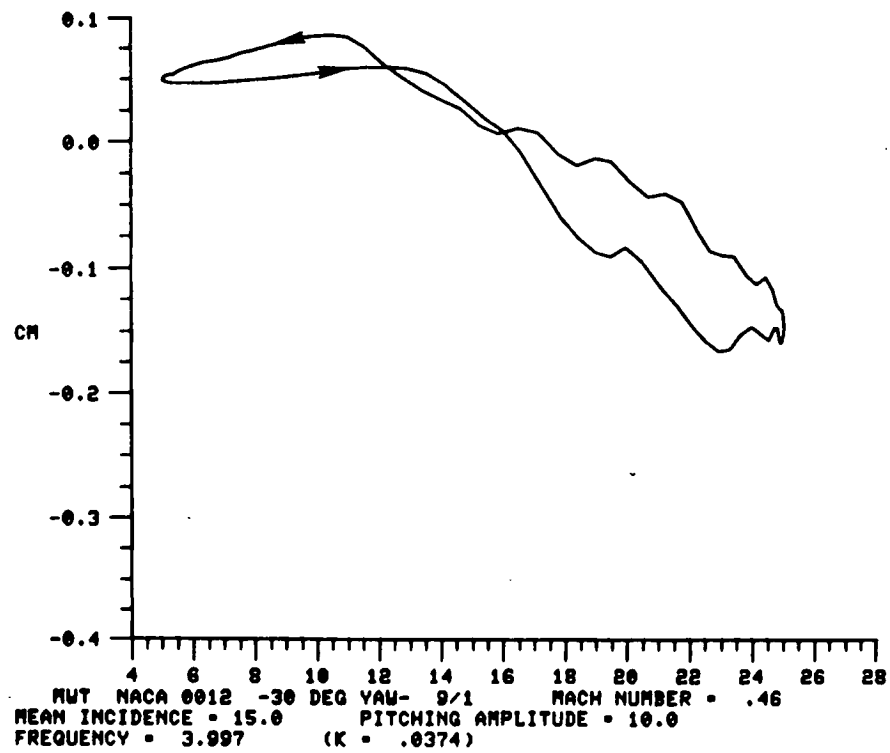


FILE 39. RUN3021.001

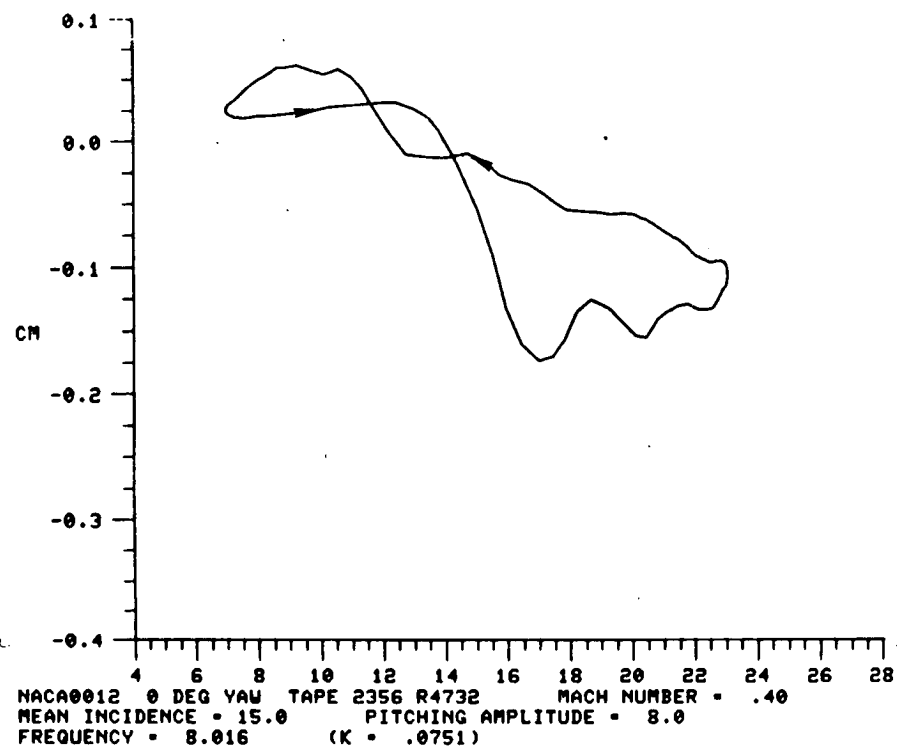


DATA WERE NOT OBTAINED

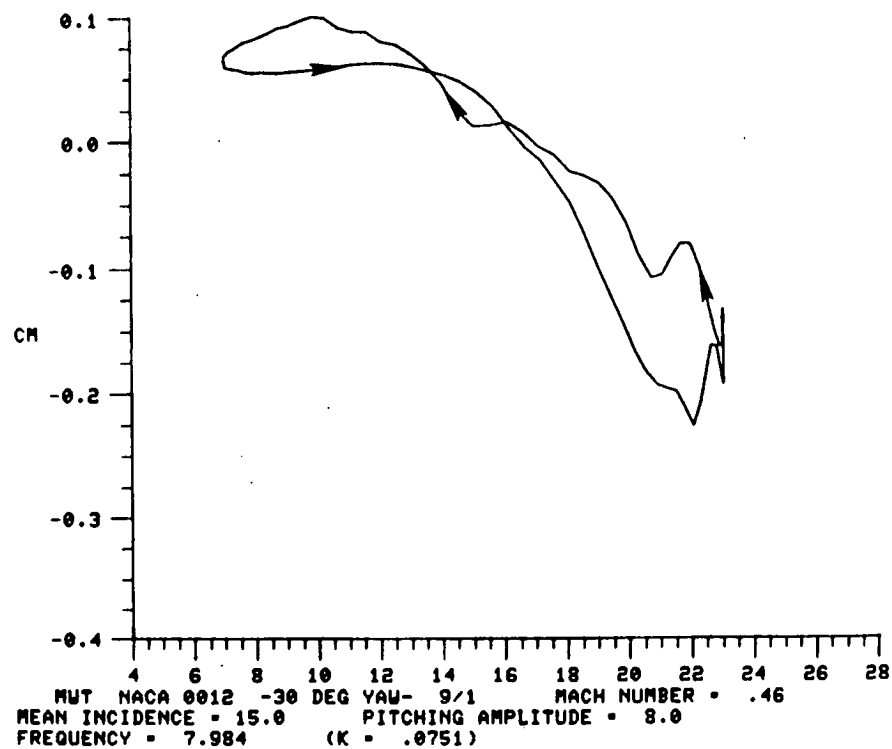
FILE 57. RUN1037.001



FILE 13. RUN 50.004

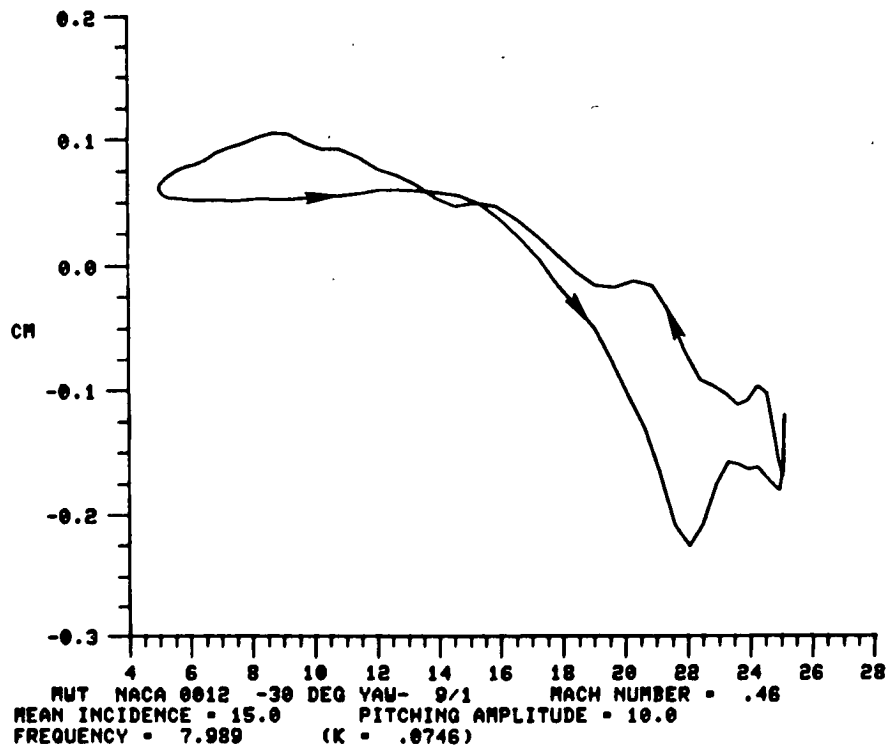


FILE 63. RUN1021.005

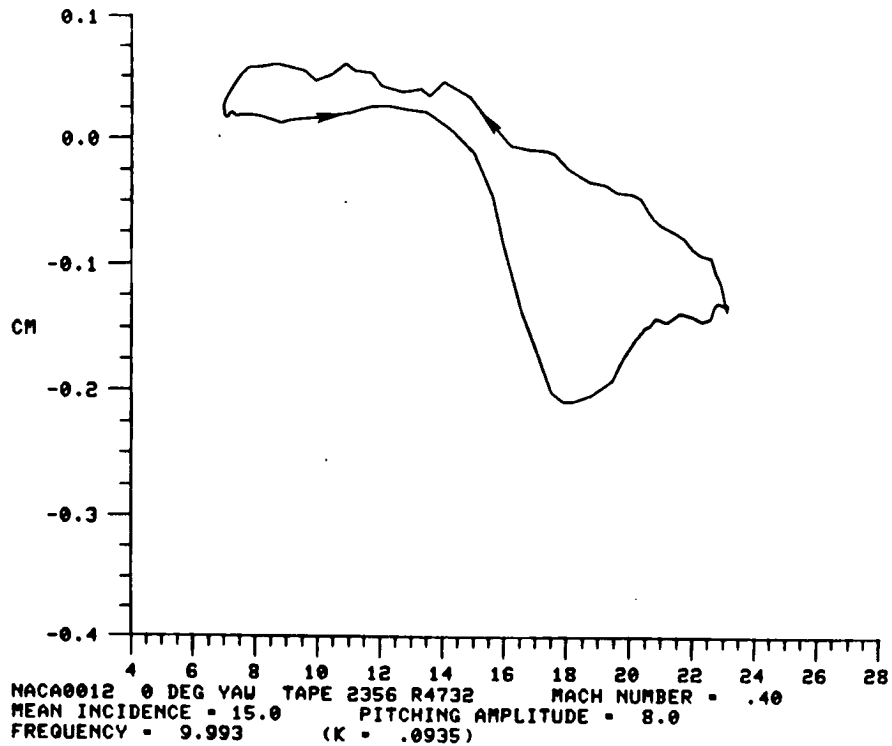


DATA WERE NOT OBTAINED

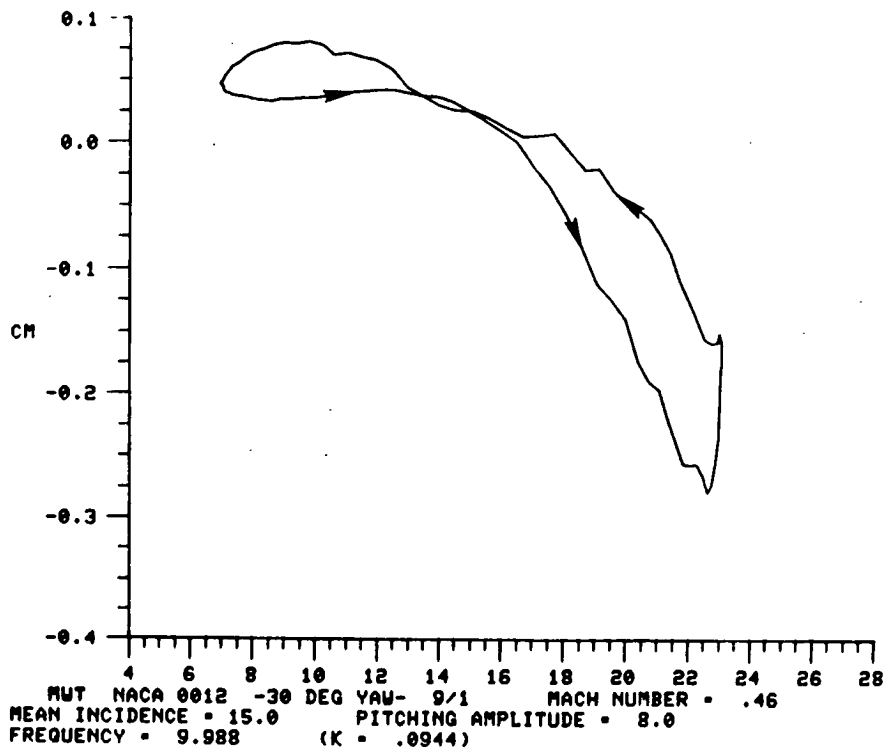
FILE 59. RUN1037.005



FILE 14. RUN 50.006

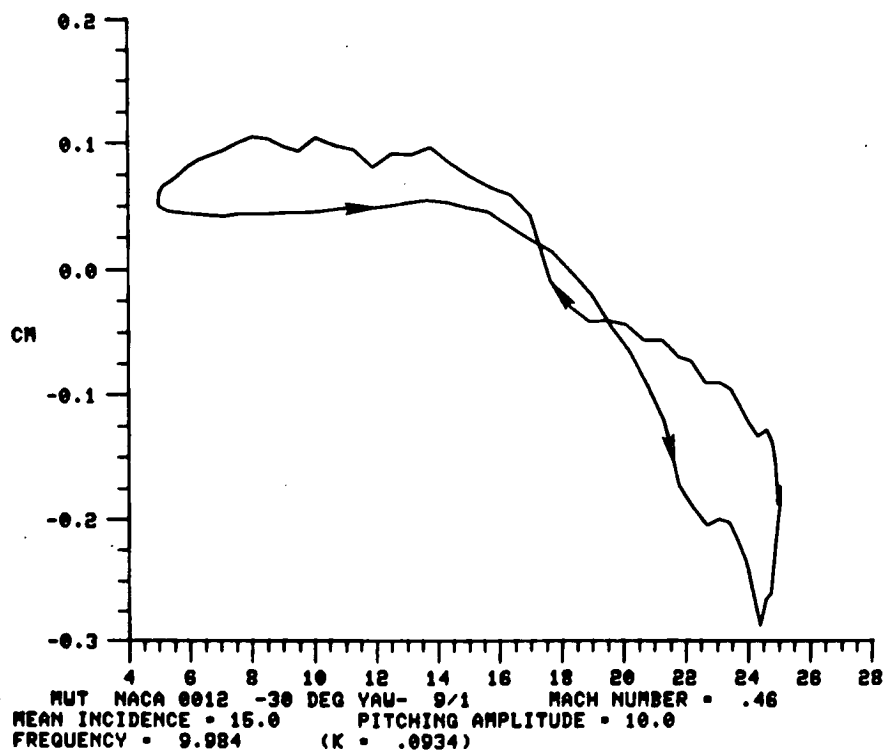


FILE 64. RUN1021.008



DATA WERE NOT OBTAINED

FILE 60. RUN1037.007

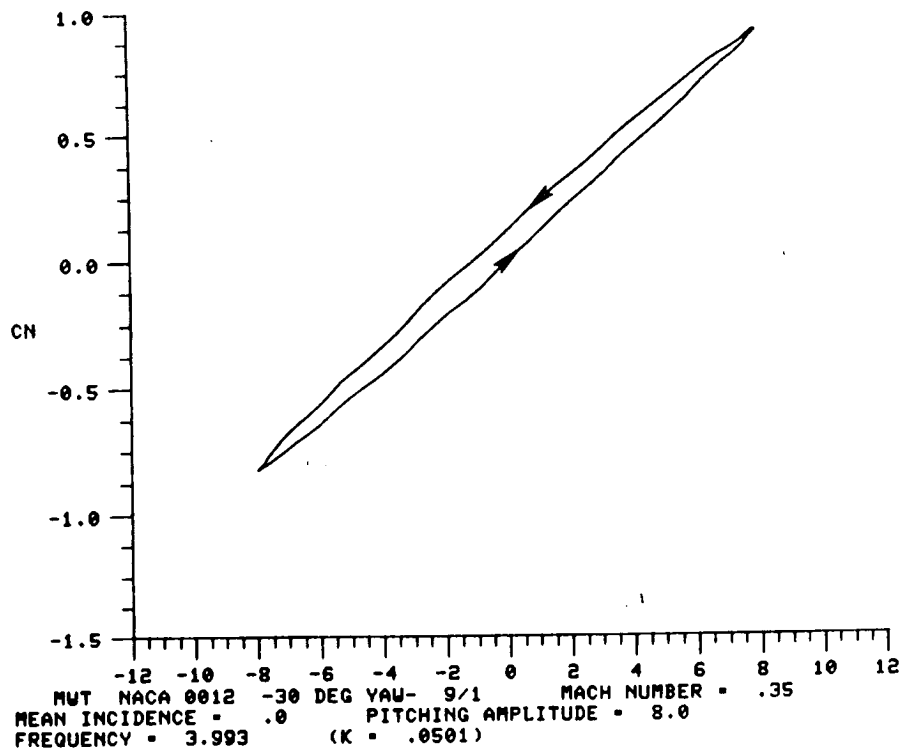


EFFECT OF MACH NUMBER ON THE SWEPT WING NORMAL FORCE RESPONSE *

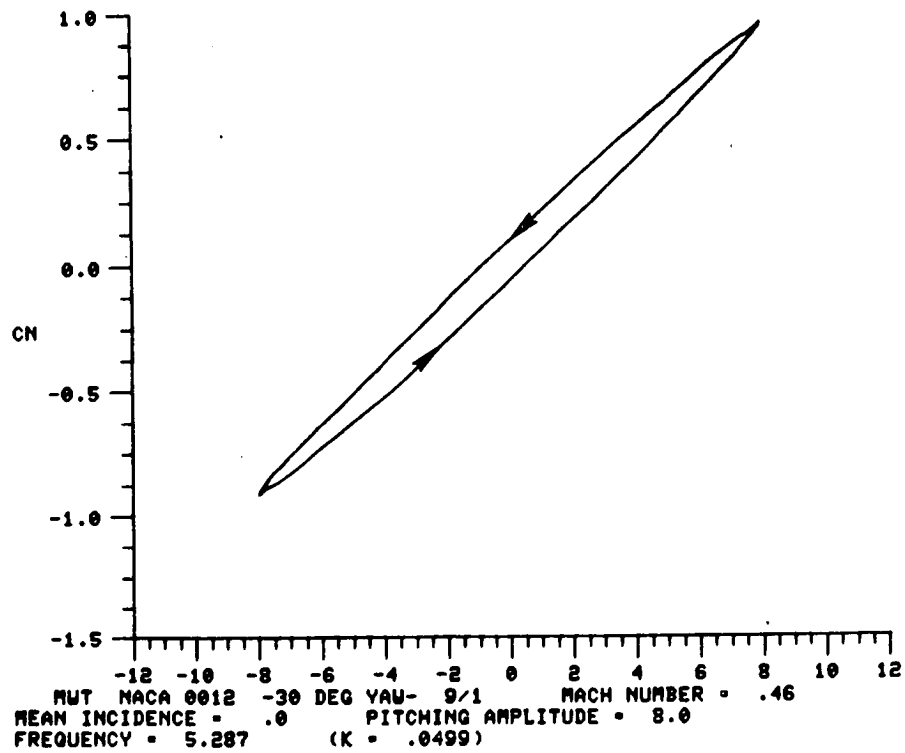
<u>Mean Incidence Angle</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0	.050	258,259
↓	.075	260,261
↓	.100	262,263
9	.050	264,265
↓	.075	266,267
↓	.100	268,269
12	.050	270,271
↓	.075	272,273
↓	.100	274,275
15	.050	276,277
↓	.075	278,279
↓	.100	280,281

* The effect of Mach number is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

FILE 8. RUN1007.005



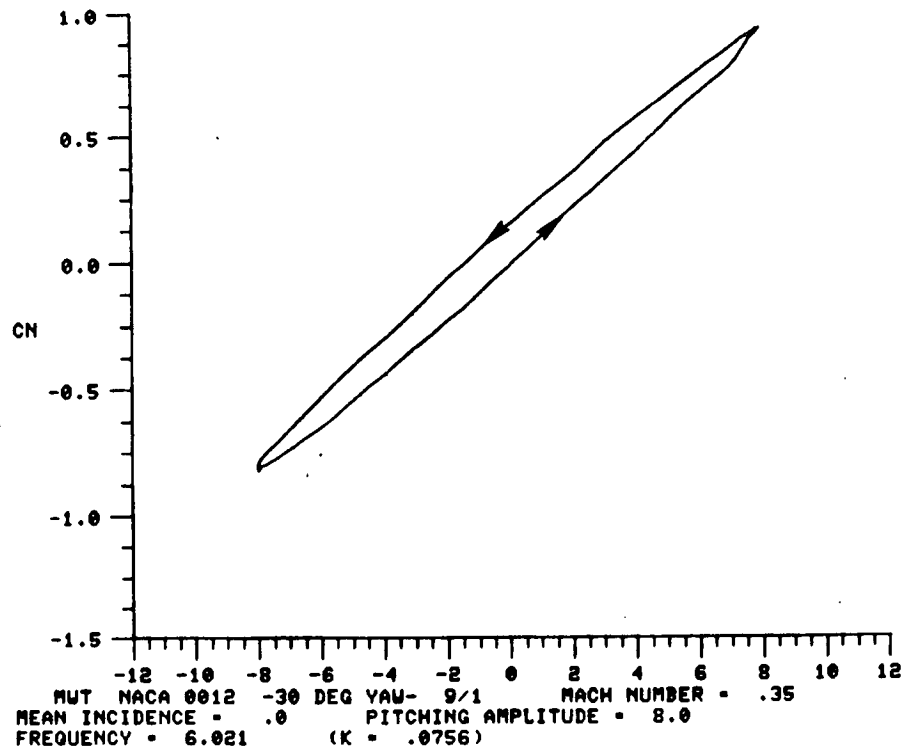
FILE 13. RUN1008.003



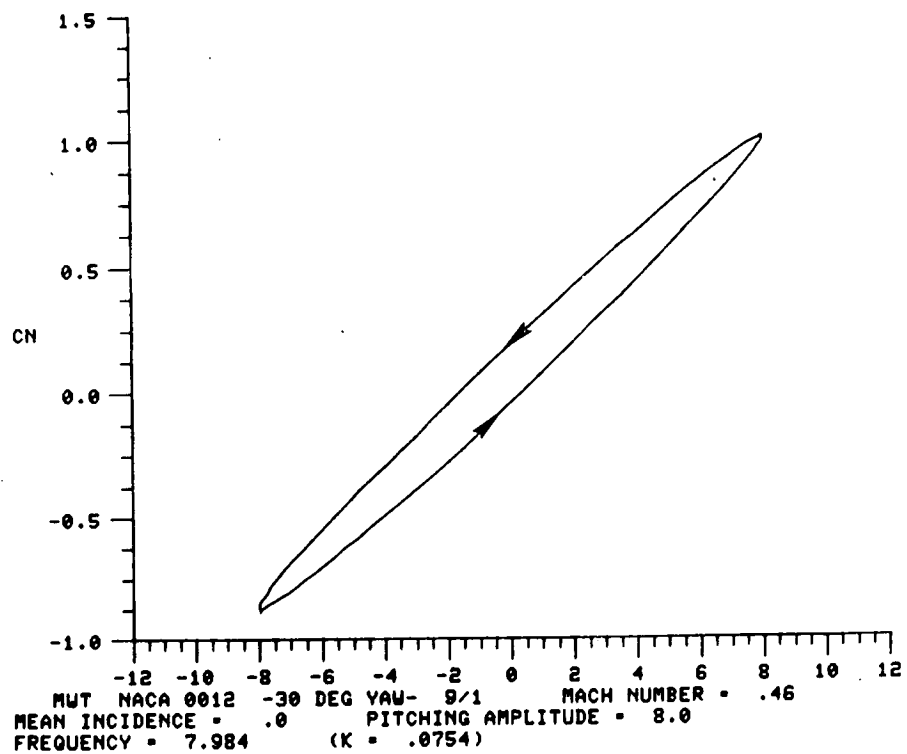
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 9. RUN1007.007



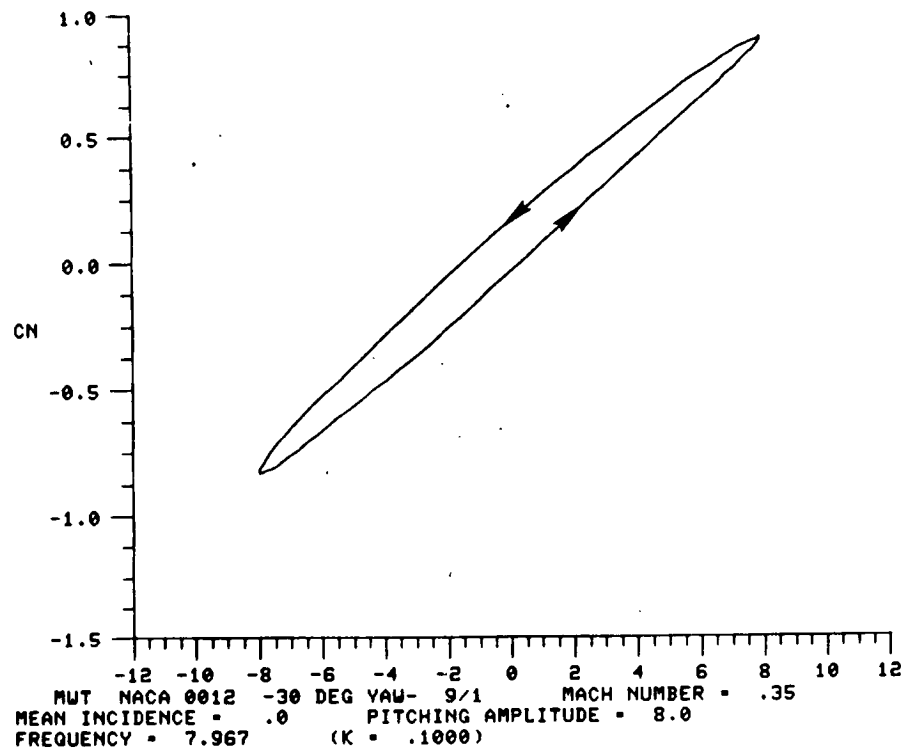
FILE 14. RUN1008.005



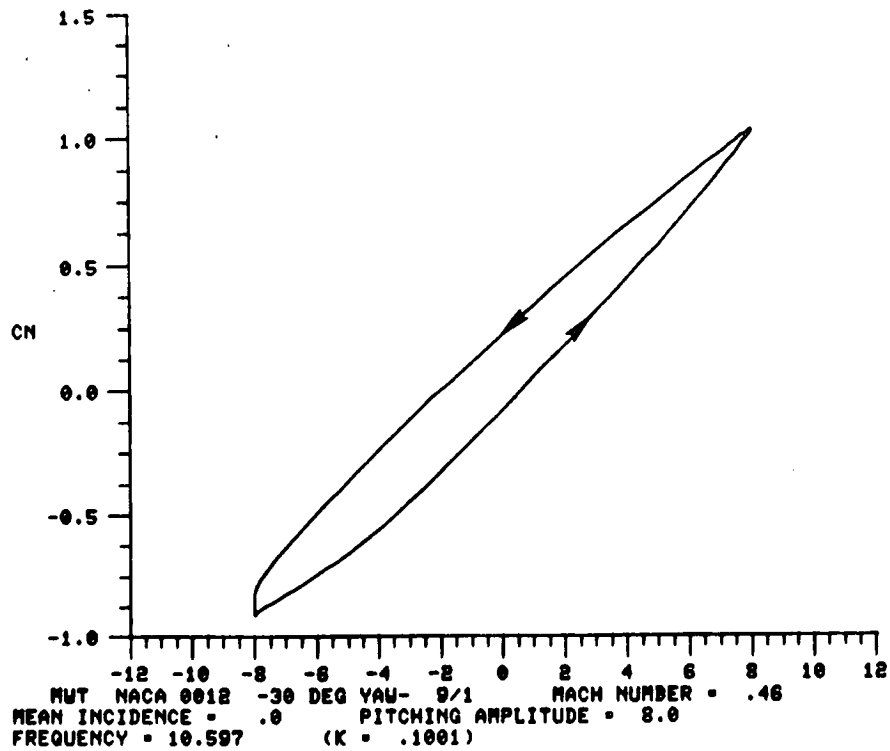
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 10. RUN1007.009



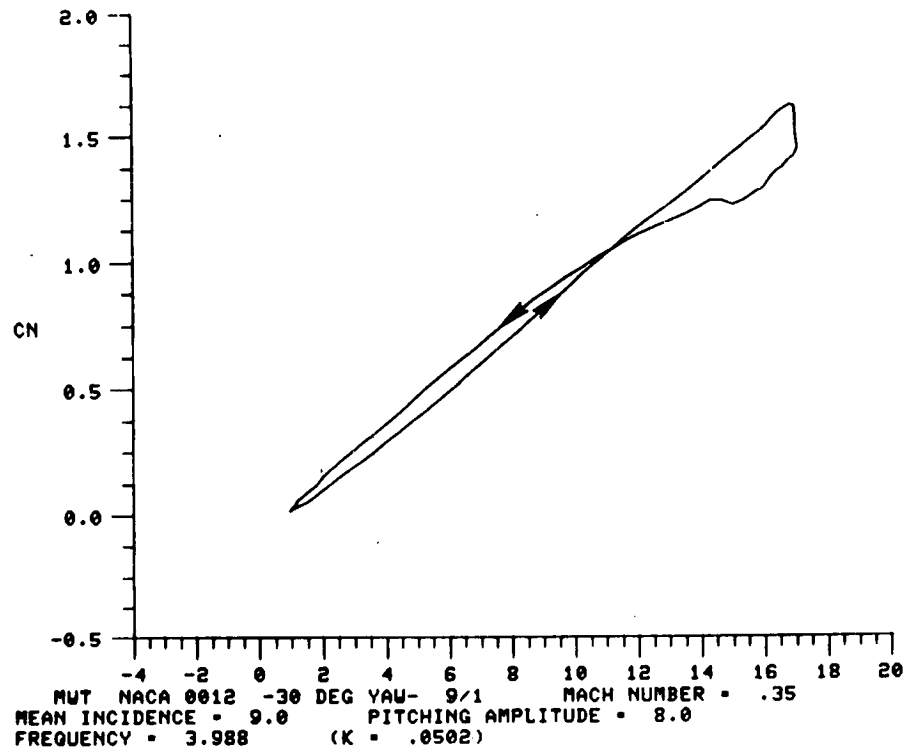
FILE 49. RUN1008.009



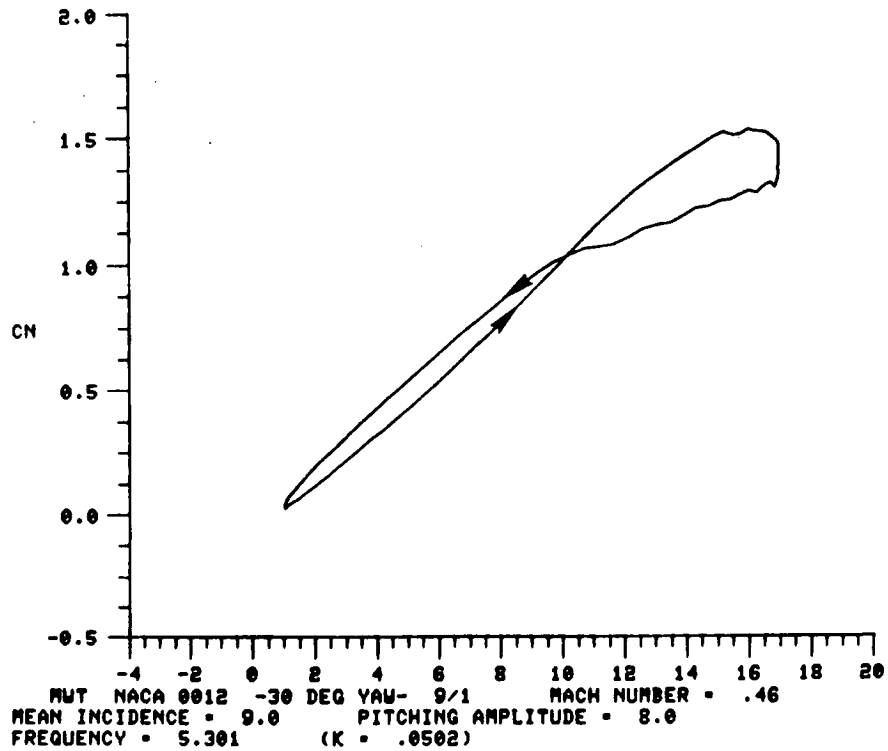
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

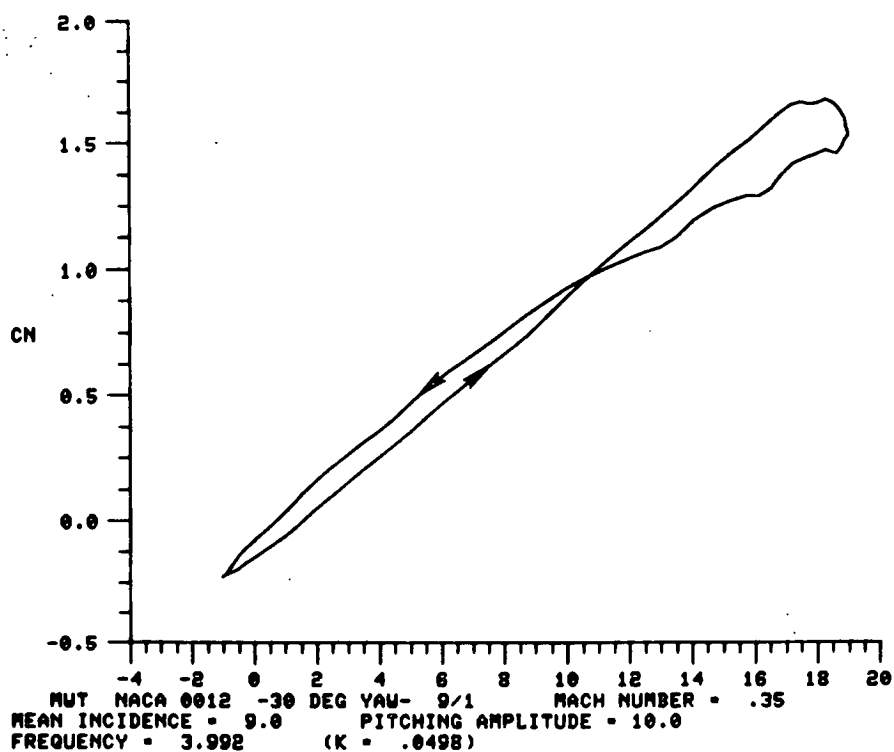
FILE 26. RUN1018.013



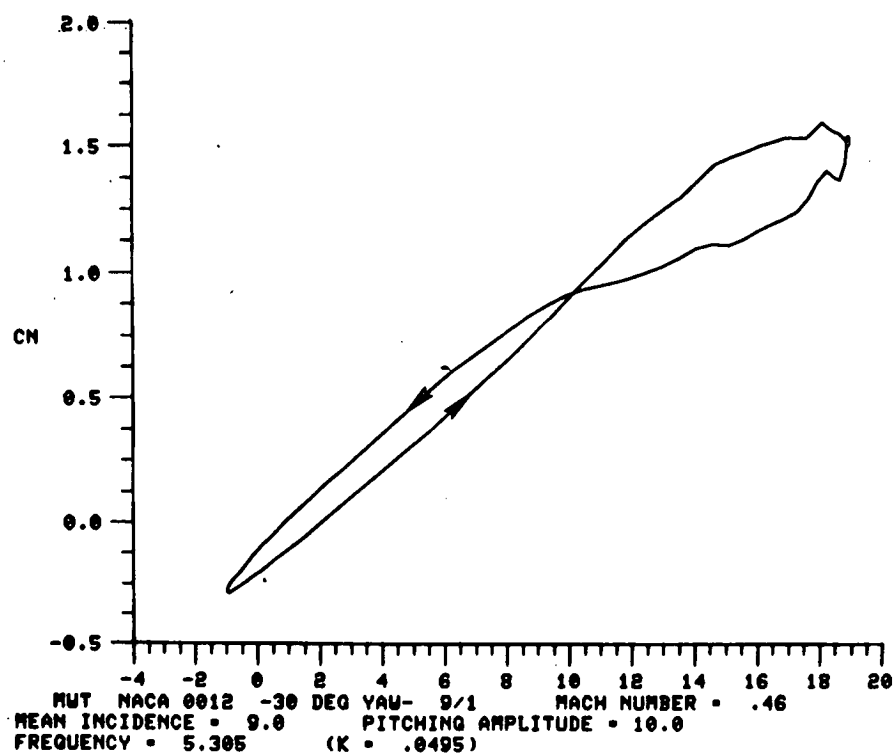
FILE 31. RUN1019.003



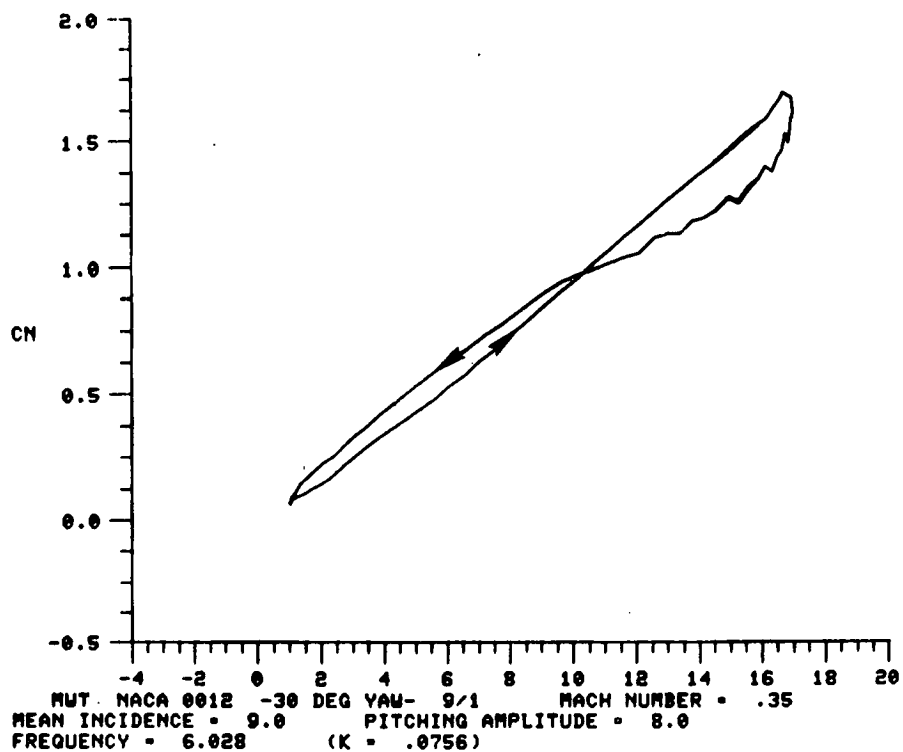
FILE 6. RUN1029.008



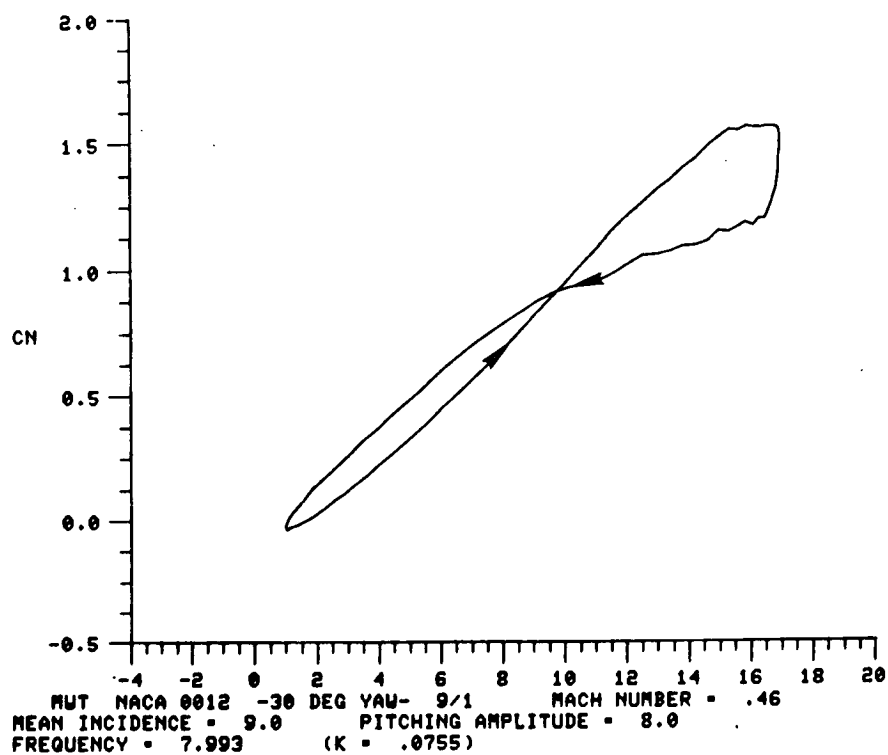
FILE 11. RUN1030.003



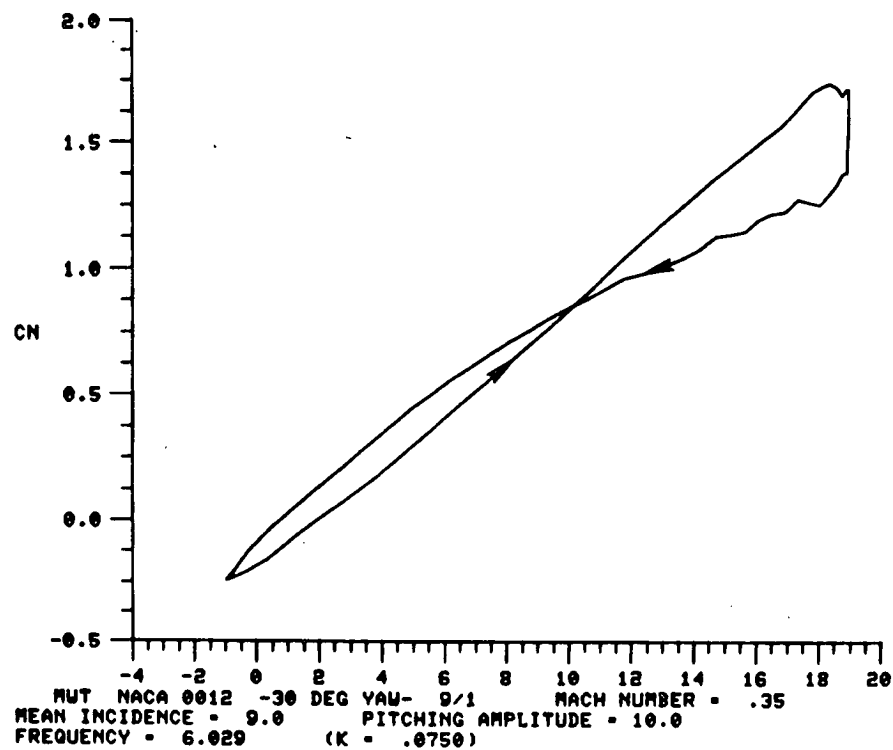
FILE 27. RUN1018.015



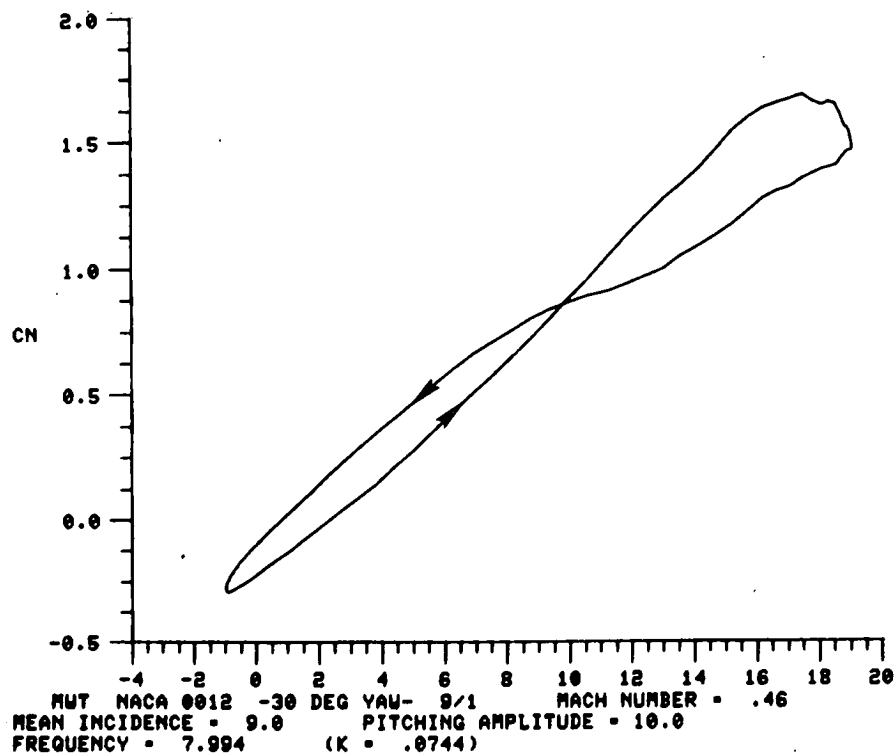
FILE 32. RUN1019.005



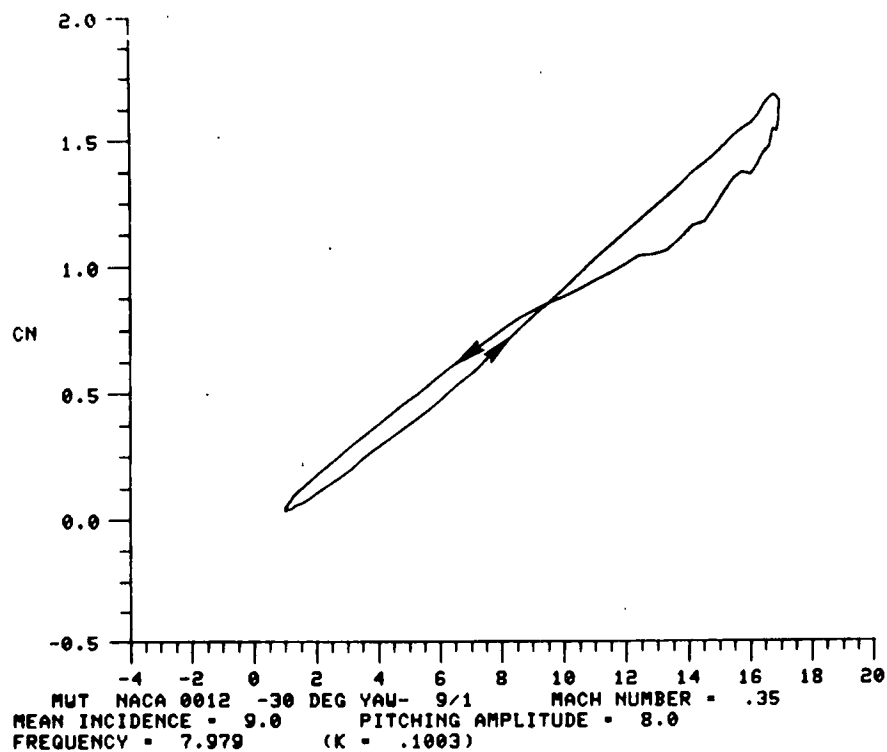
FILE 7. RUN1029.010



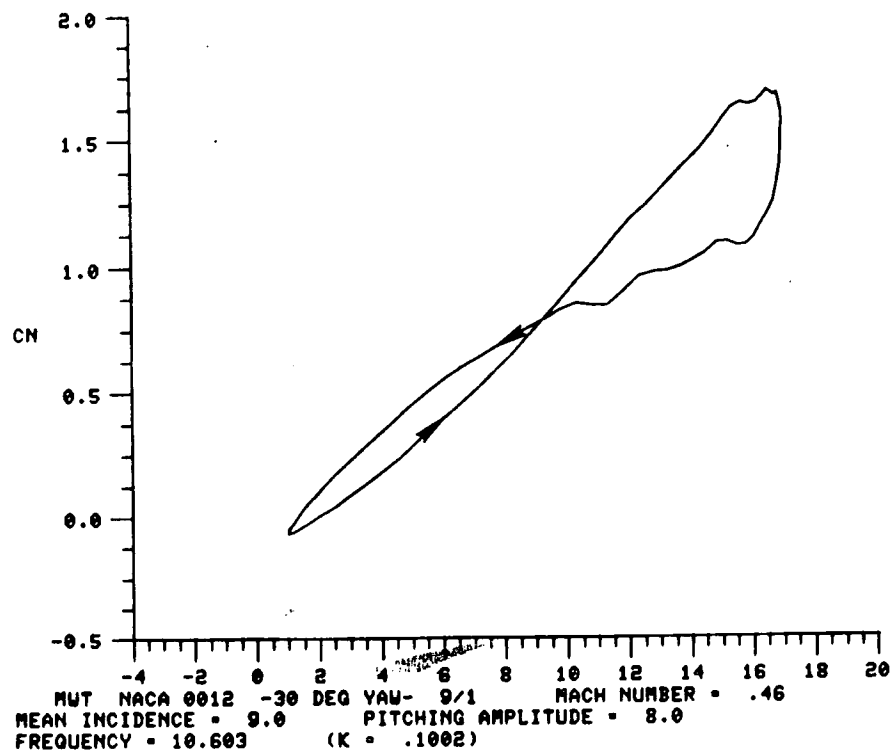
FILE 12. RUN1030.005



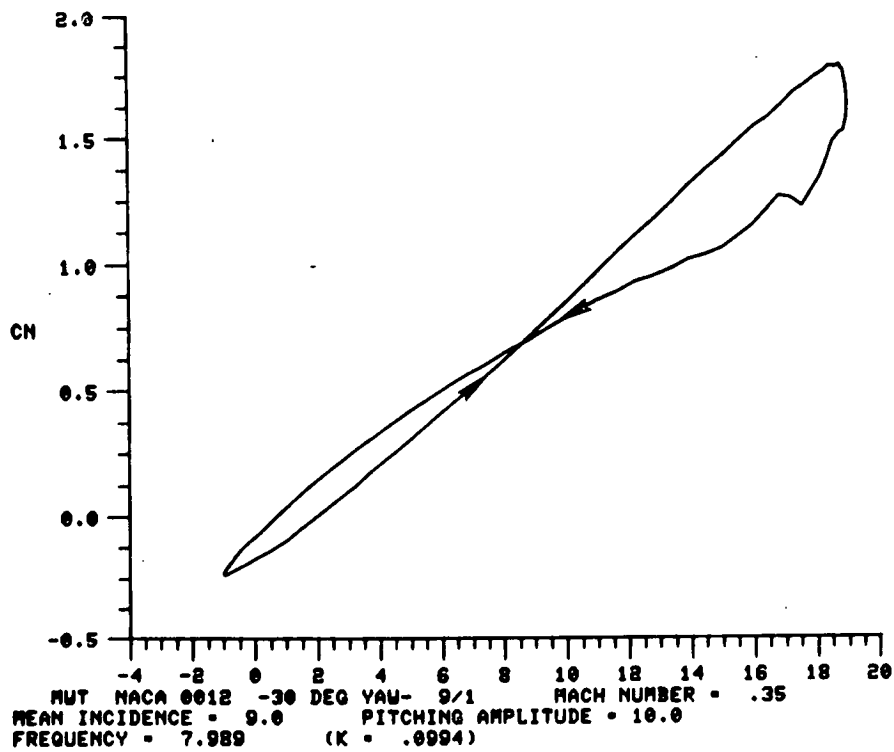
FILE 28. RUN1018.017



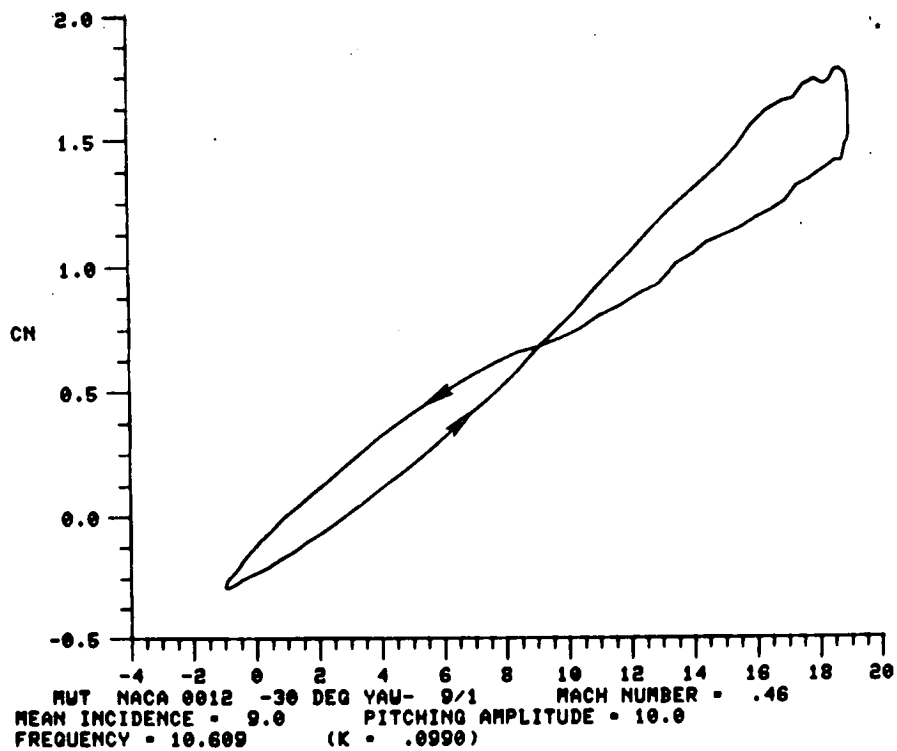
FILE 34. RUN1019.009



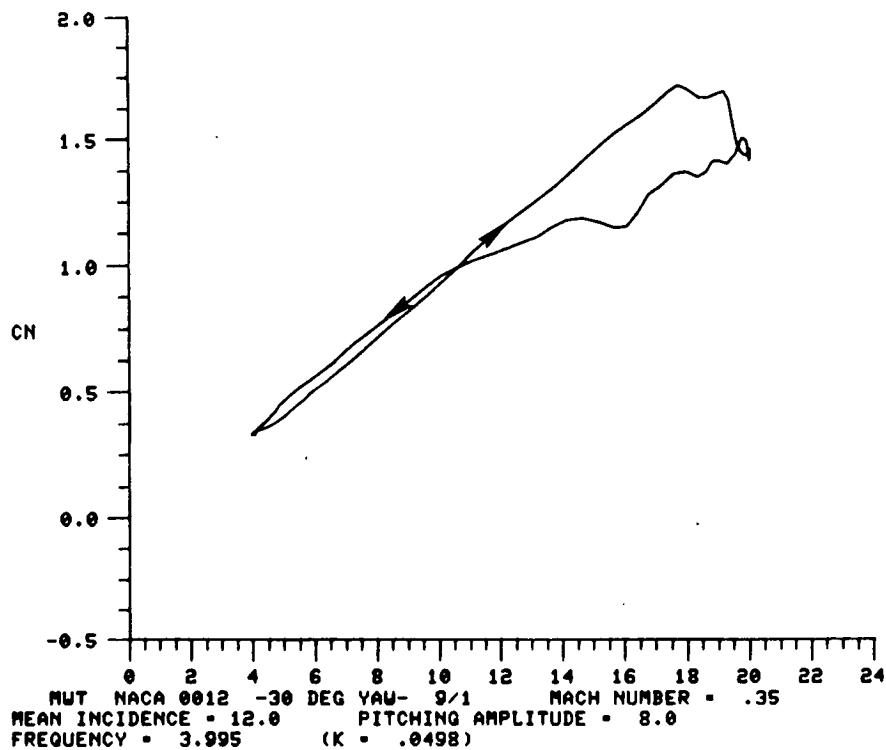
FILE 8. RUN1029.012



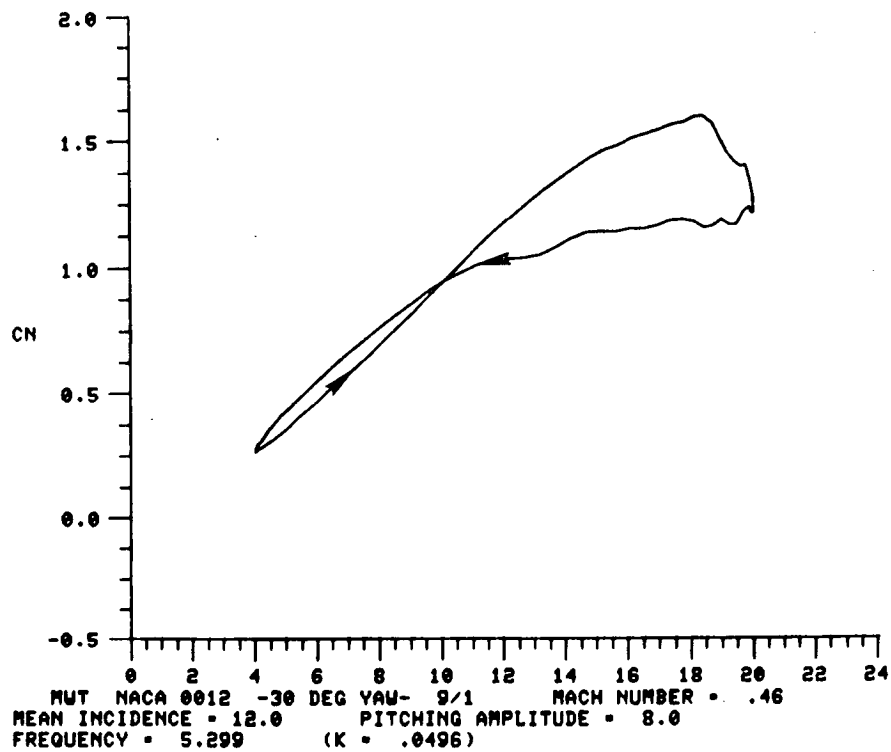
FILE 14. RUN1030.009



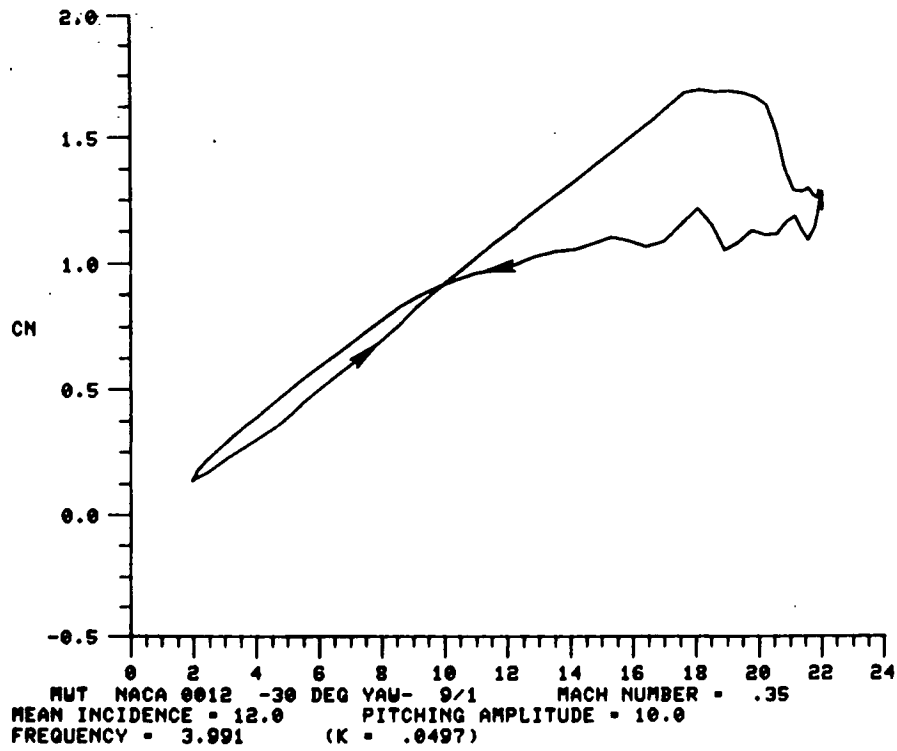
FILE 53. RUN1016.004



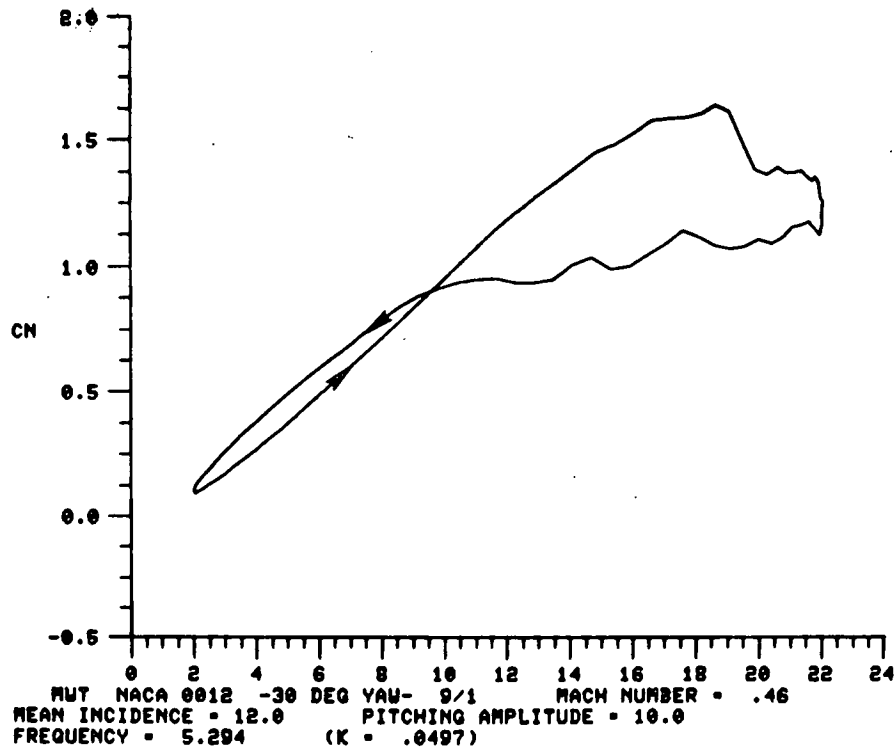
FILE 56. RUN1017.003



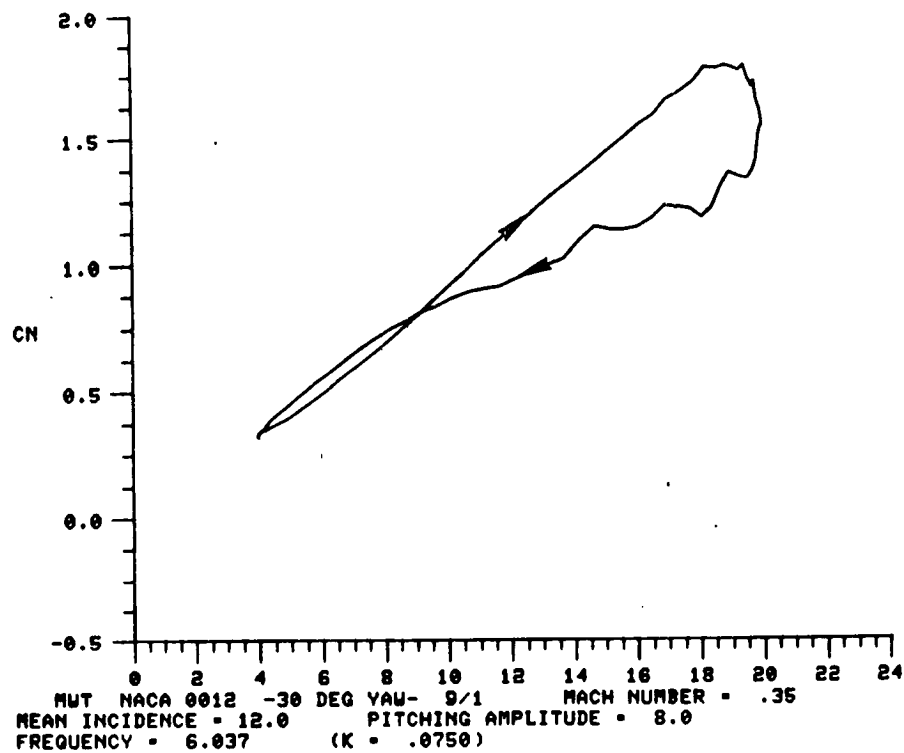
FILE 39. RUN1033.008



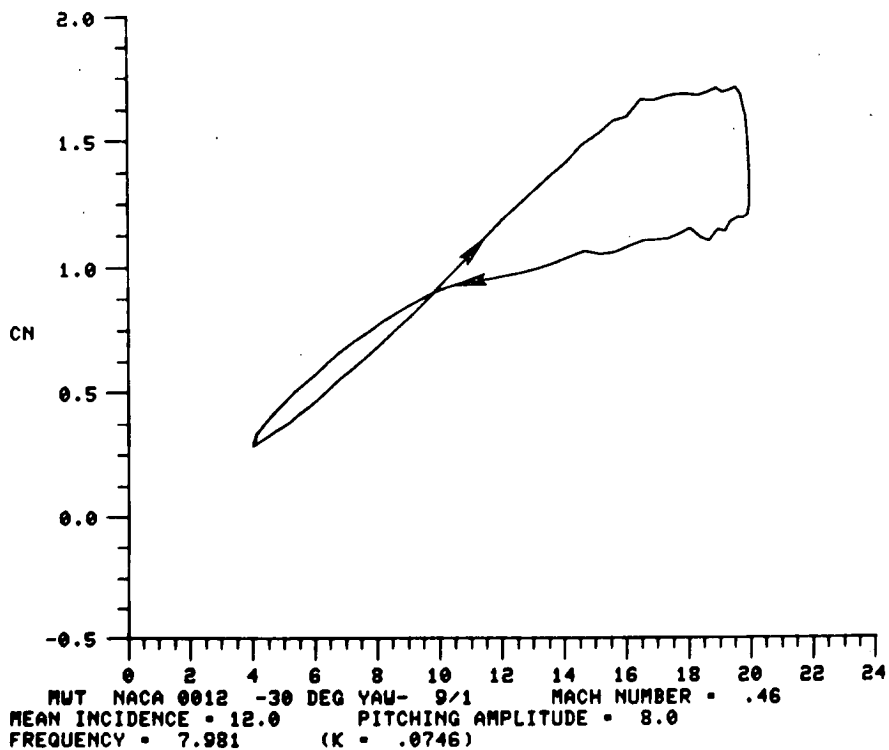
FILE 44. RUN1034.003



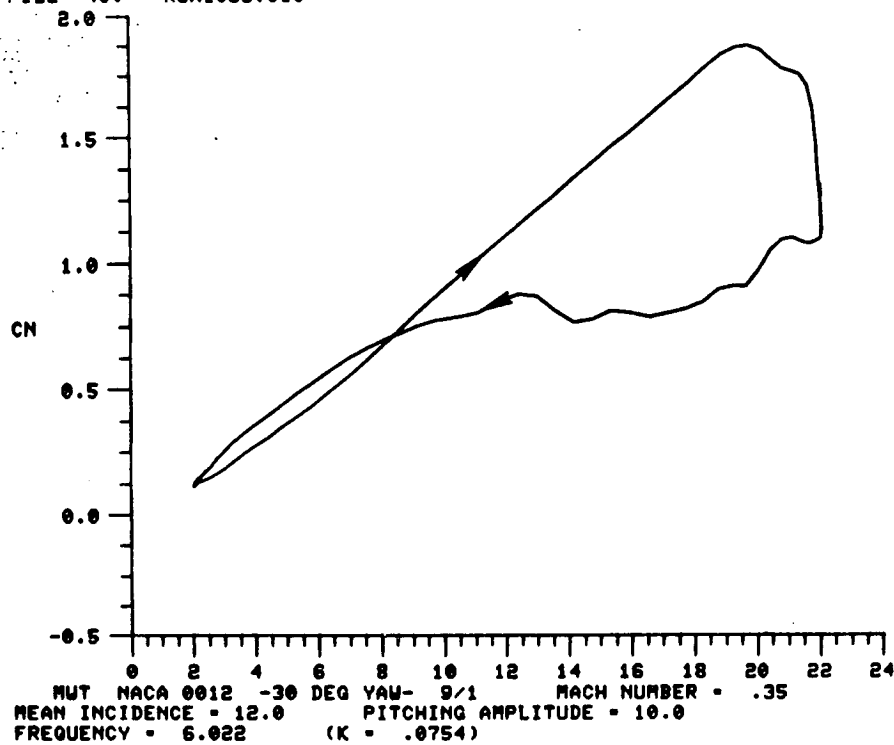
FILE 18. RUN1016.008



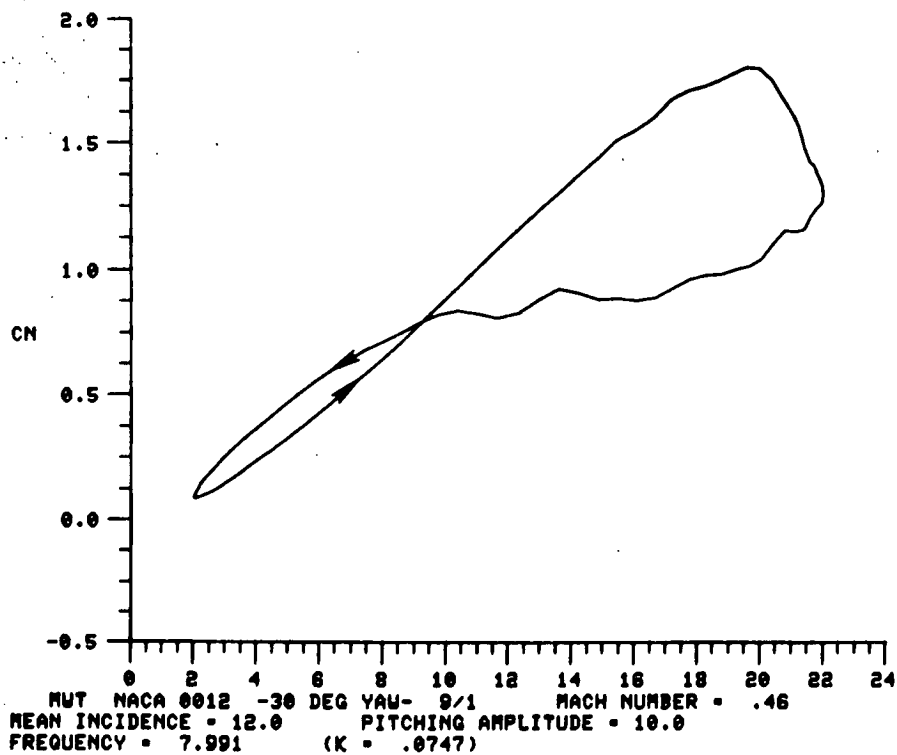
FILE 57. RUN1017.005



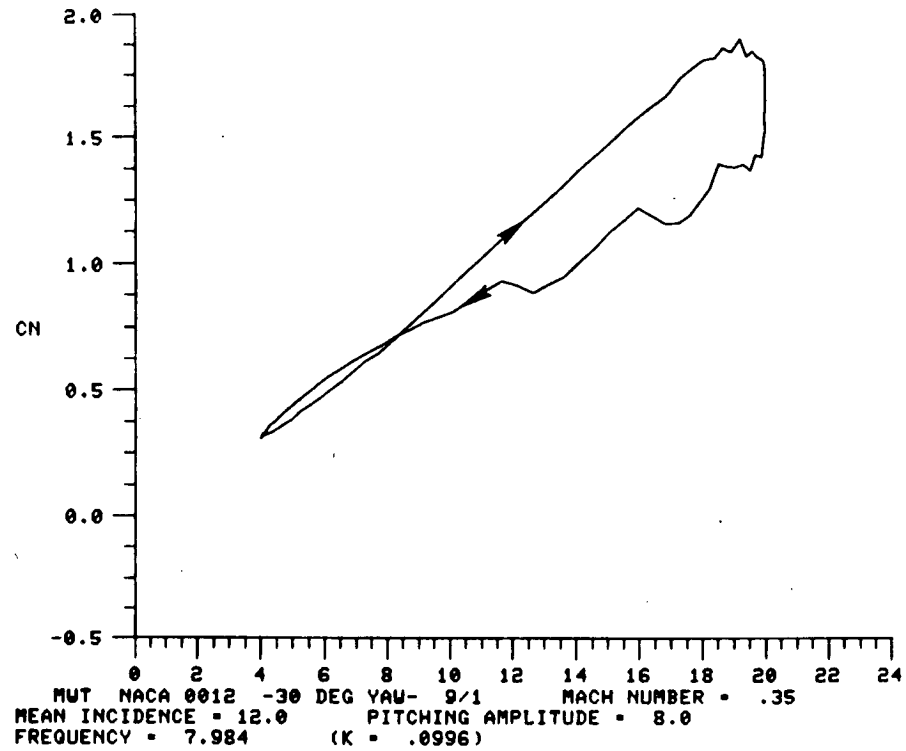
FILE 40. RUN1033.010



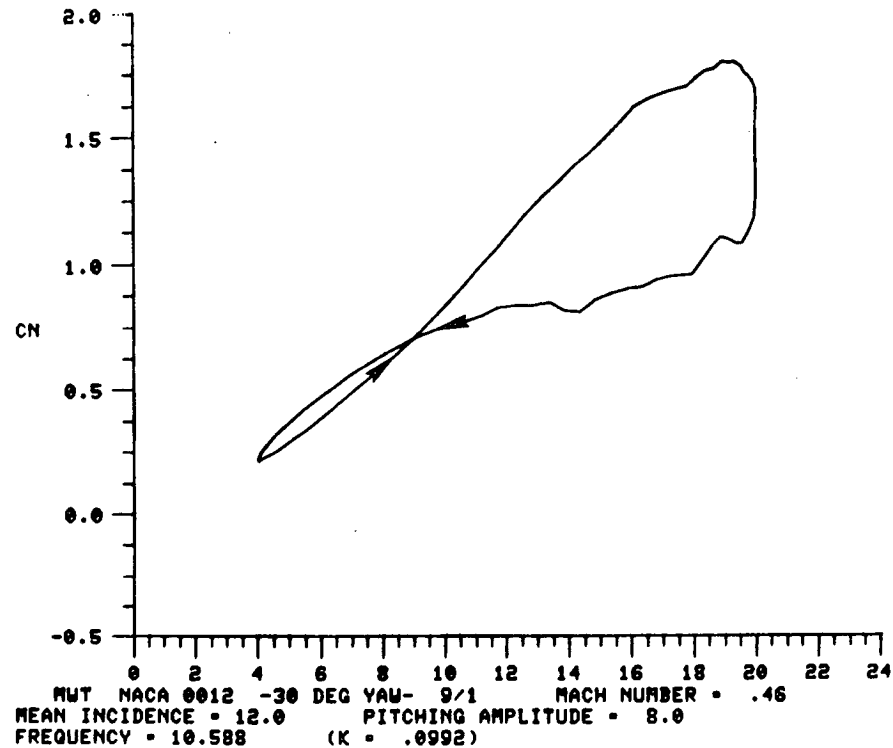
FILE 45. RUN1034.005



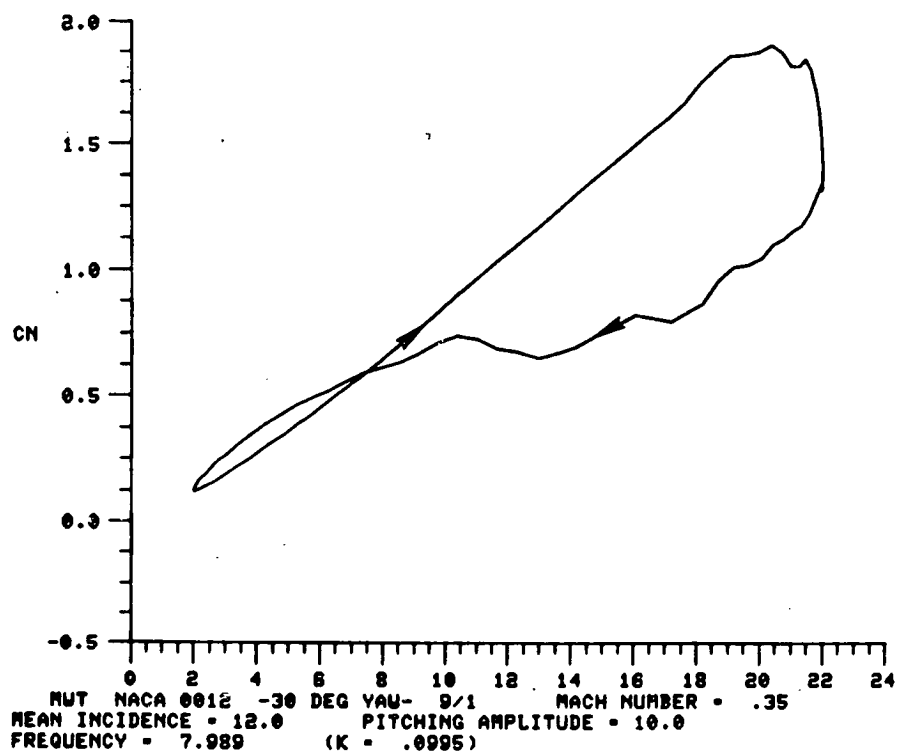
FILE 19. RUN1016.010



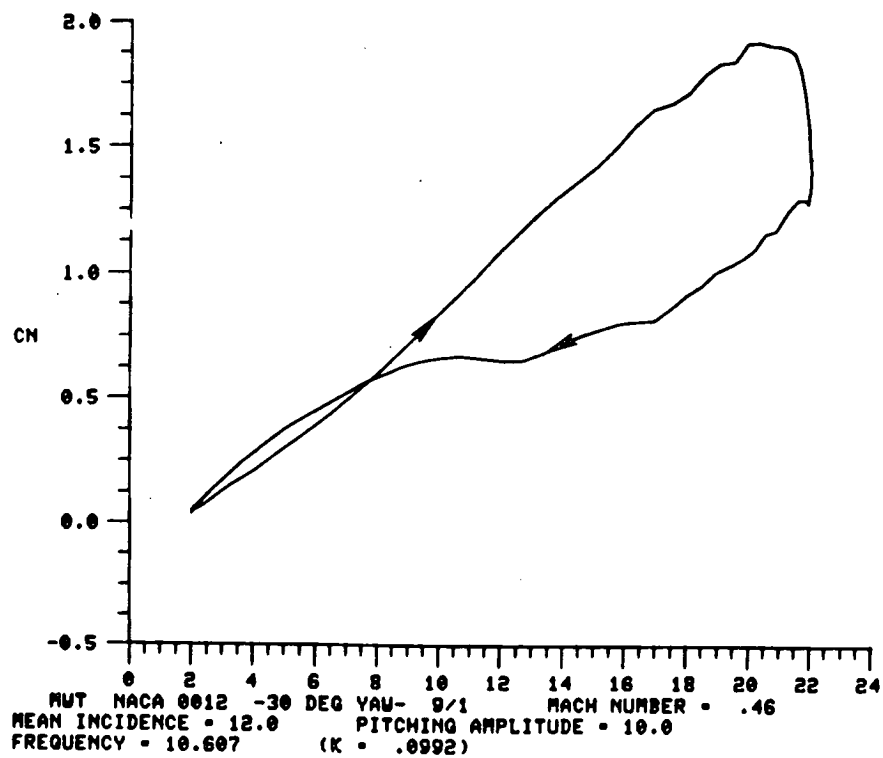
FILE 58. RUN1017.009



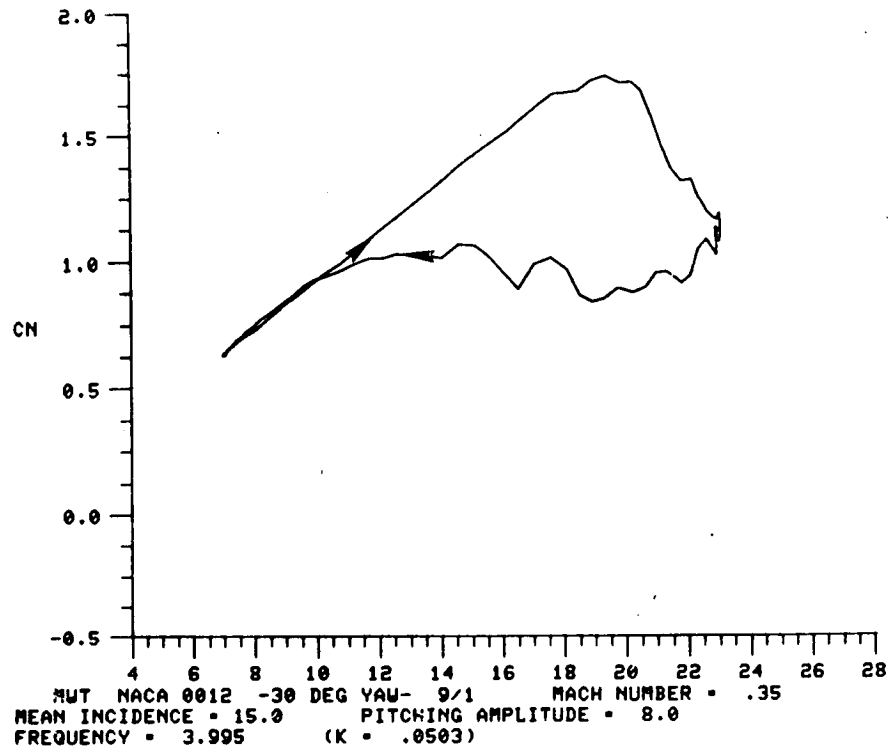
FILE 41. RUN1033.012



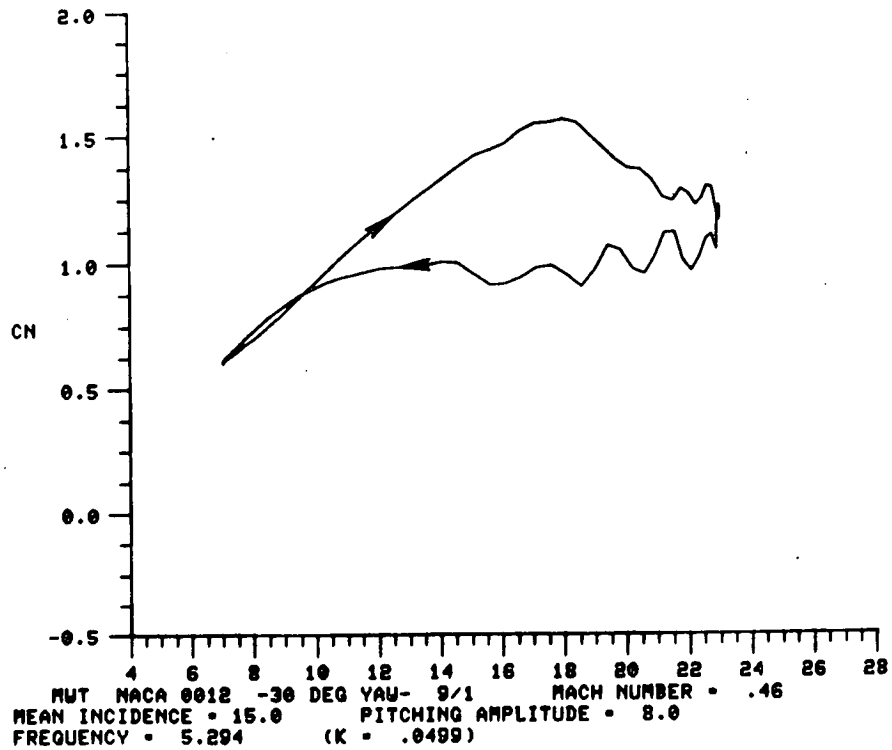
FILE 47. RUN1034.009



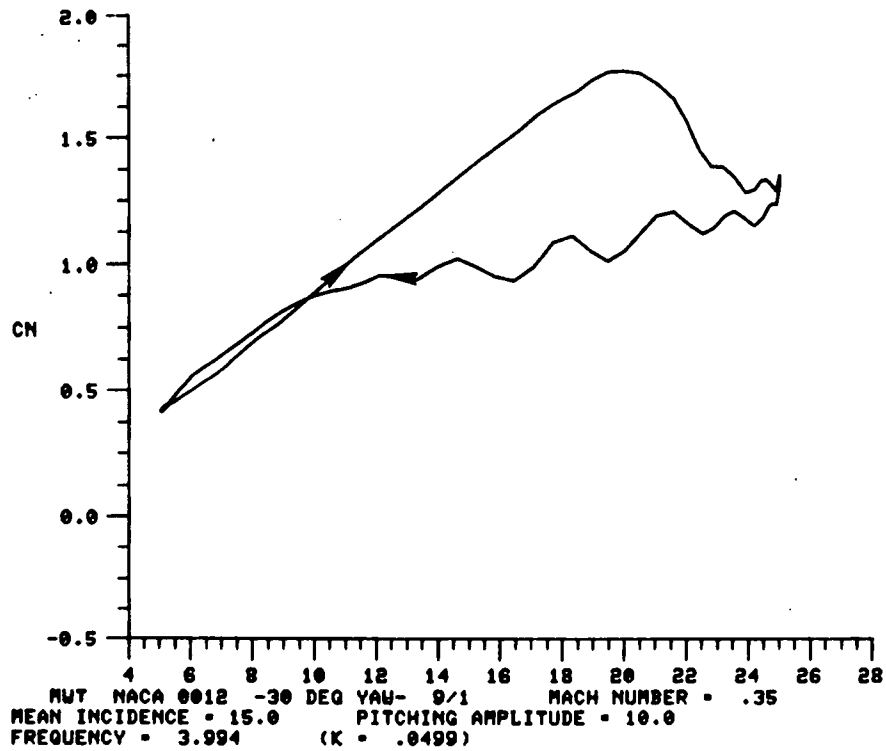
FILE 35. RUN1020.008



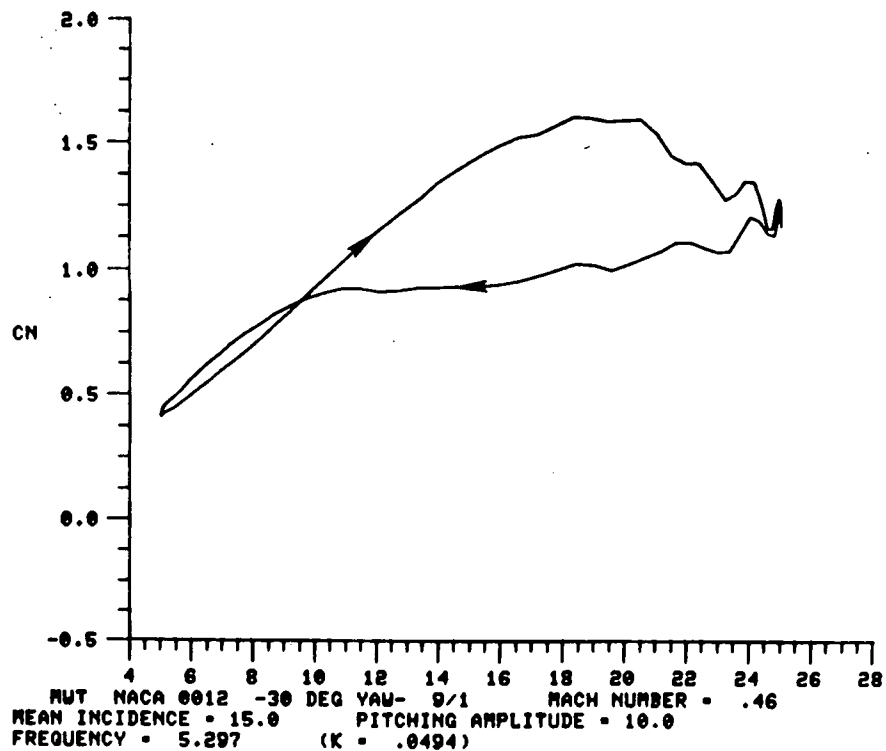
FILE 40. RUN1021.003



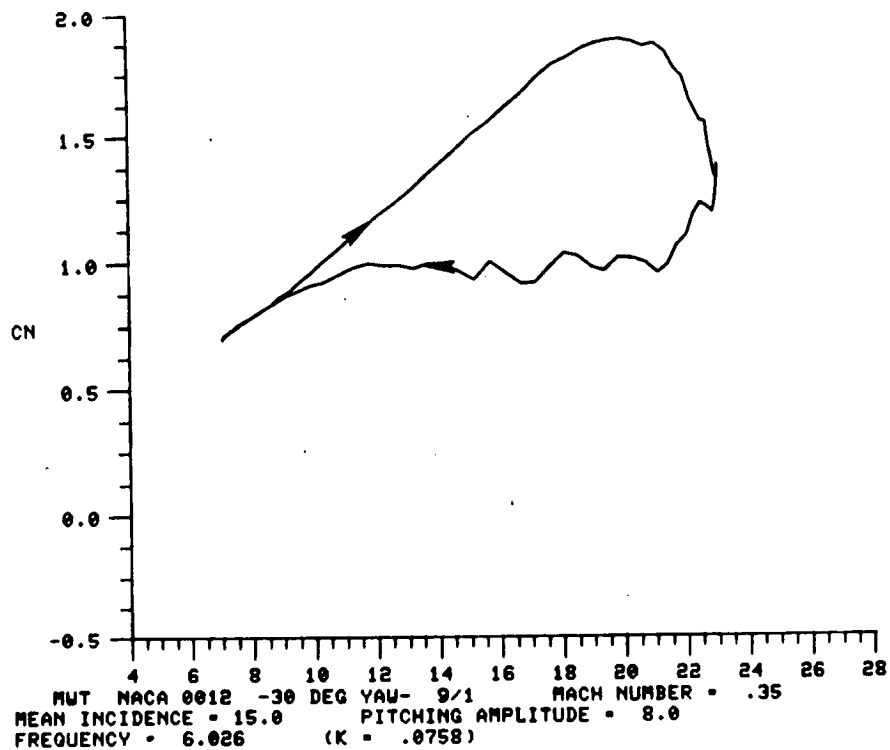
FILE 53. RUN1036.001



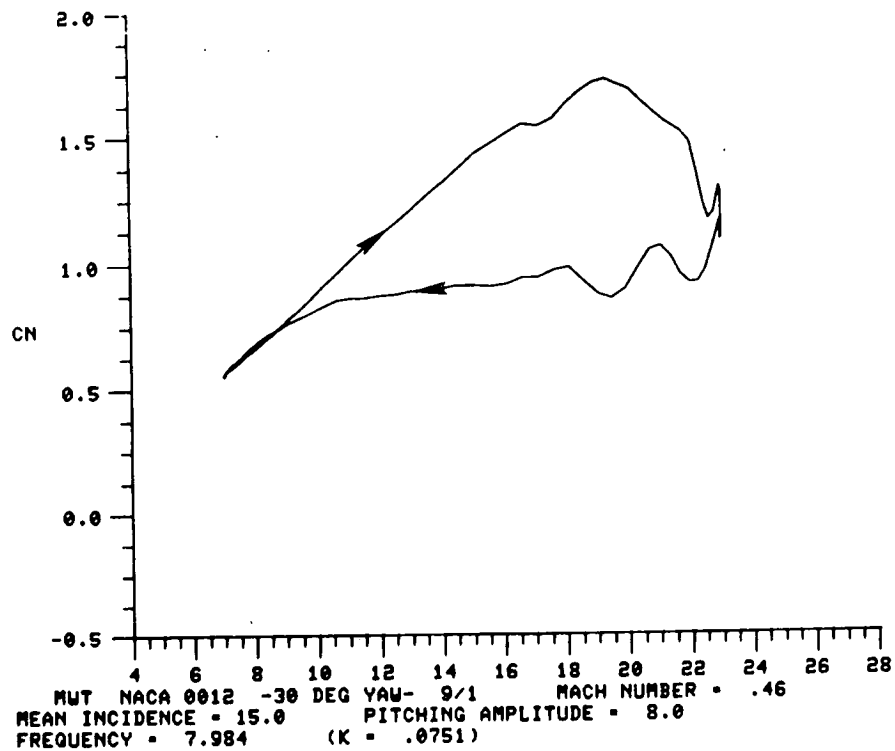
FILE 58. RUN1037.003



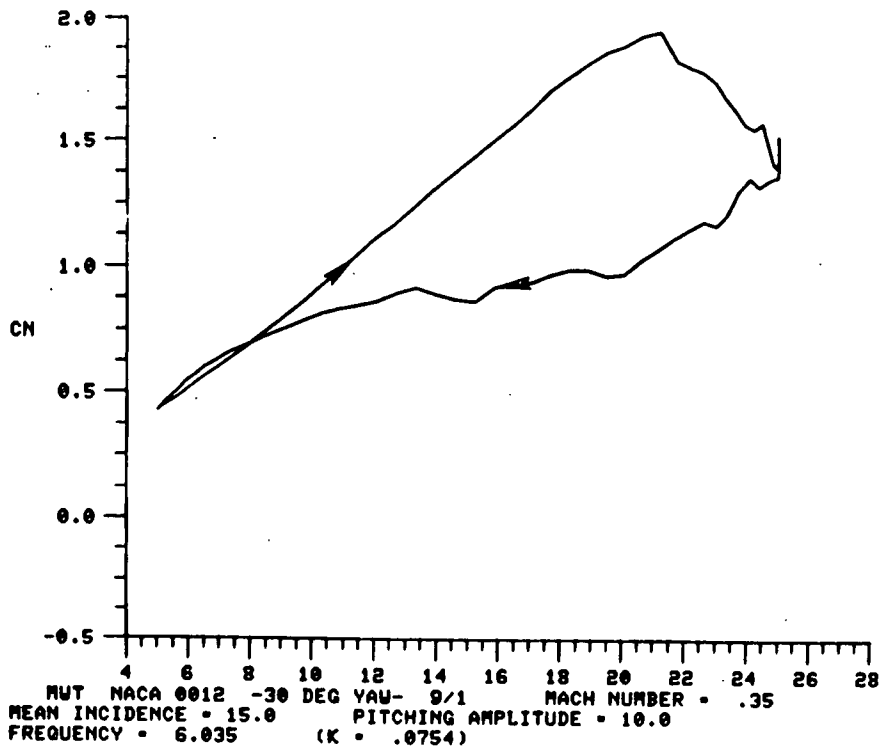
FILE 36. RUN1020.010



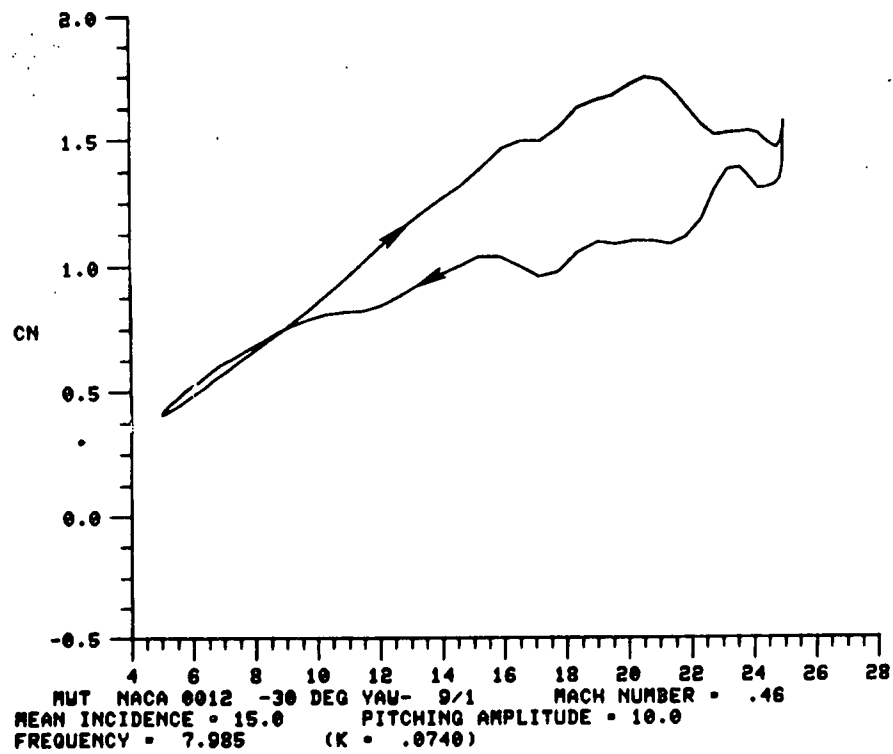
FILE 63. RUN1021.005



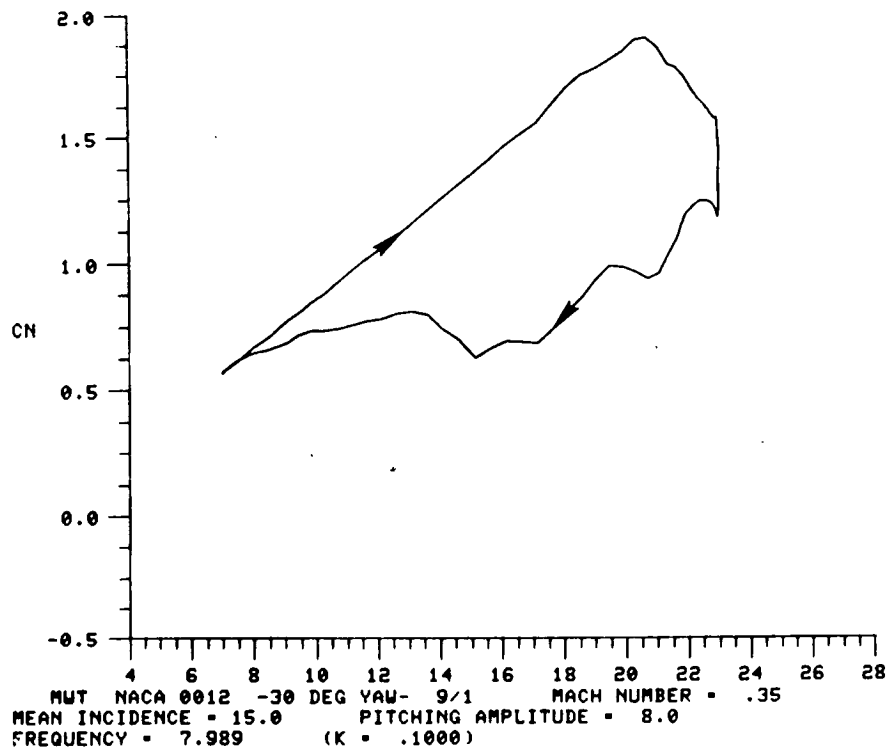
FILE 54. RUN1036.003



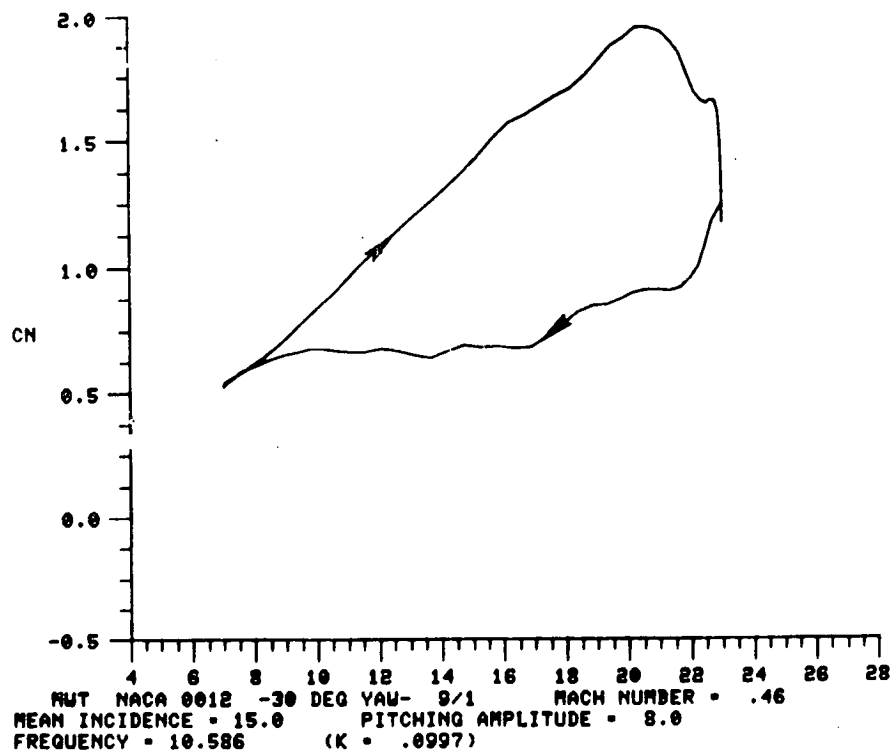
FILE 76. RUN1042.003



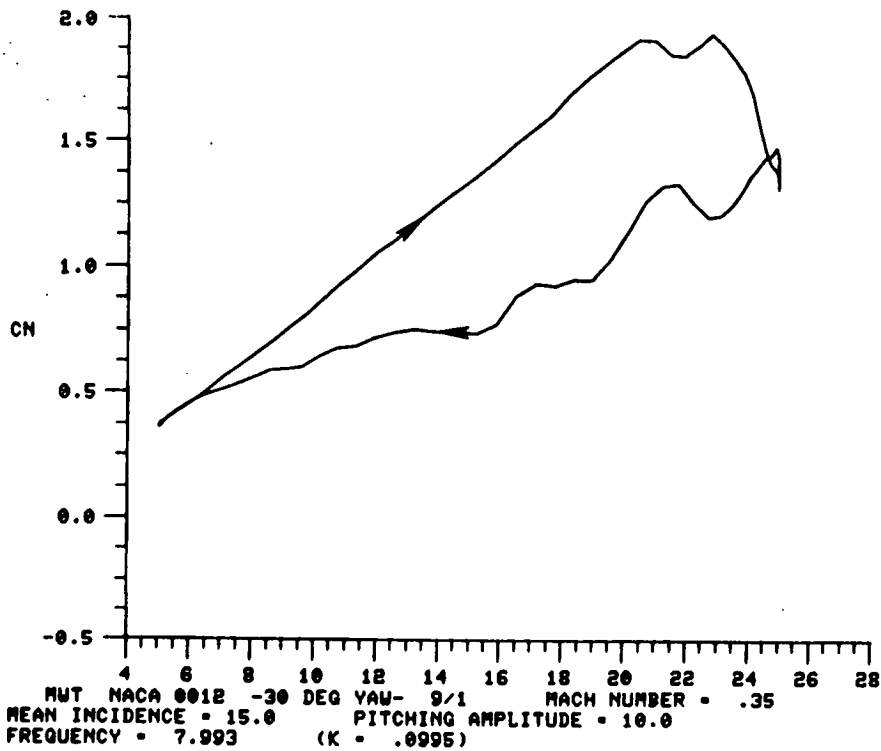
FILE 37. RUN1020.012



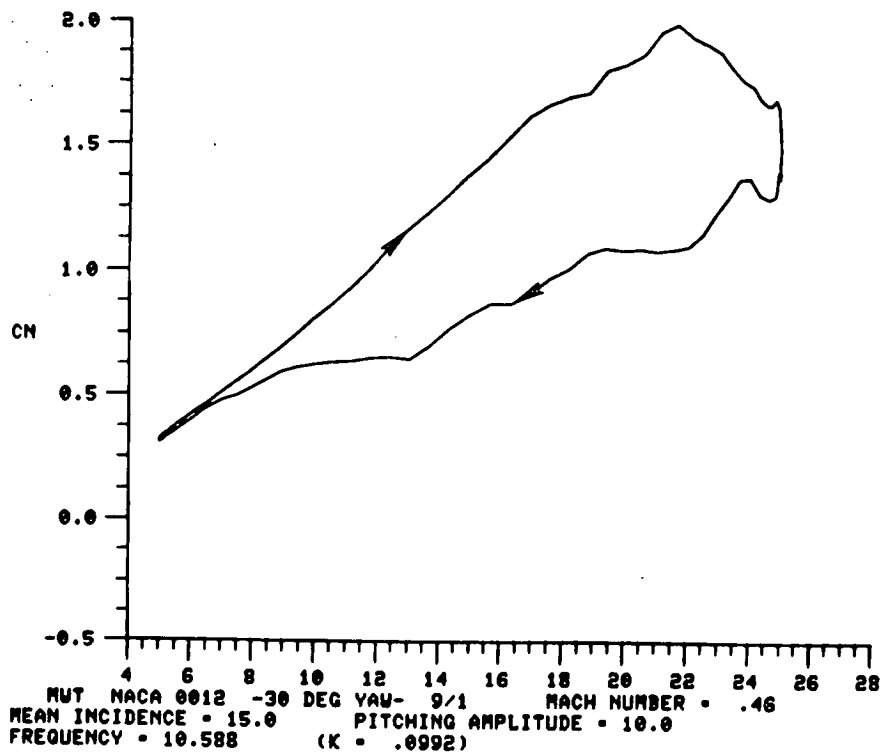
FILE 65. RUN1021.010



FILE 55. RUN1036.005



FILE 61. RUN1037.009

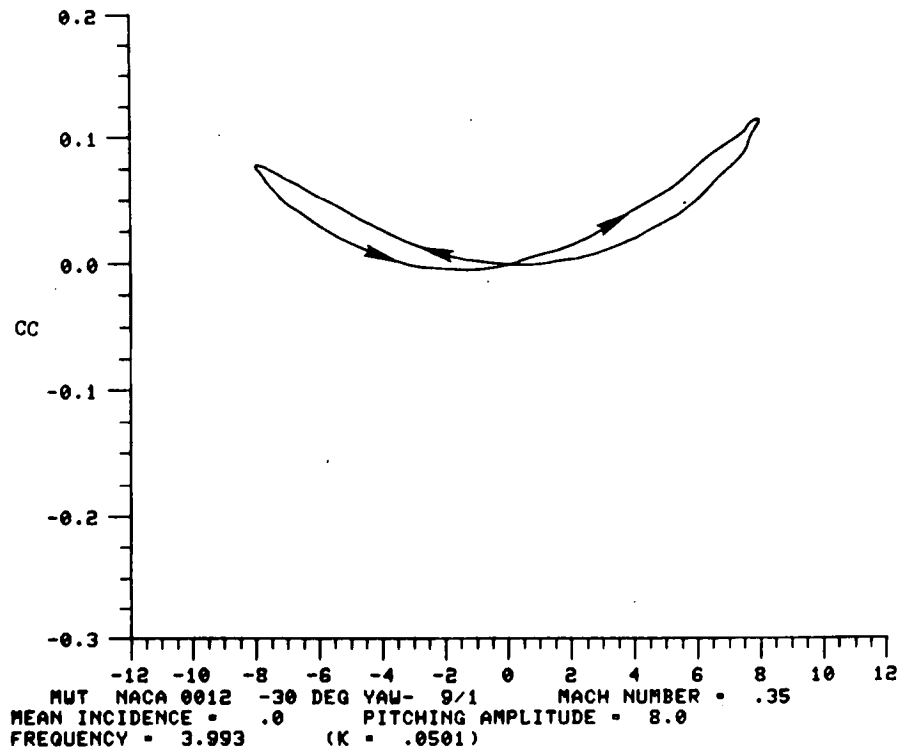


EFFECT OF MACH NUMBER ON THE SWEEP WING CHORD FORCE RESPONSE *

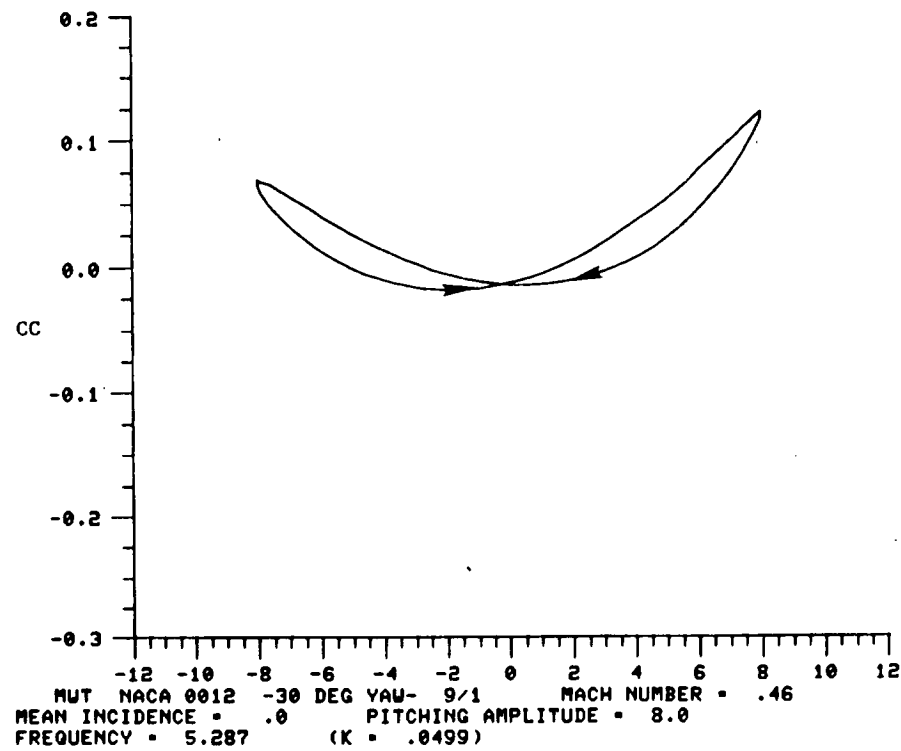
<u>Mean Incidence Angle</u>	<u>Reduced Frequency</u>	<u>Page</u> *
0	.050	284,285
↓	.075	286,287
↓	.100	288,289
9	.050	290,291
↓	.075	292,293
↓	.100	294,295
12	.050	296,297
↓	.075	298,299
↓	.100	300,301
15	.050	302,303
↓	.075	304,305
↓	.100	306,307

* The effect of Mach number is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

FILE 8. RUN1007.005



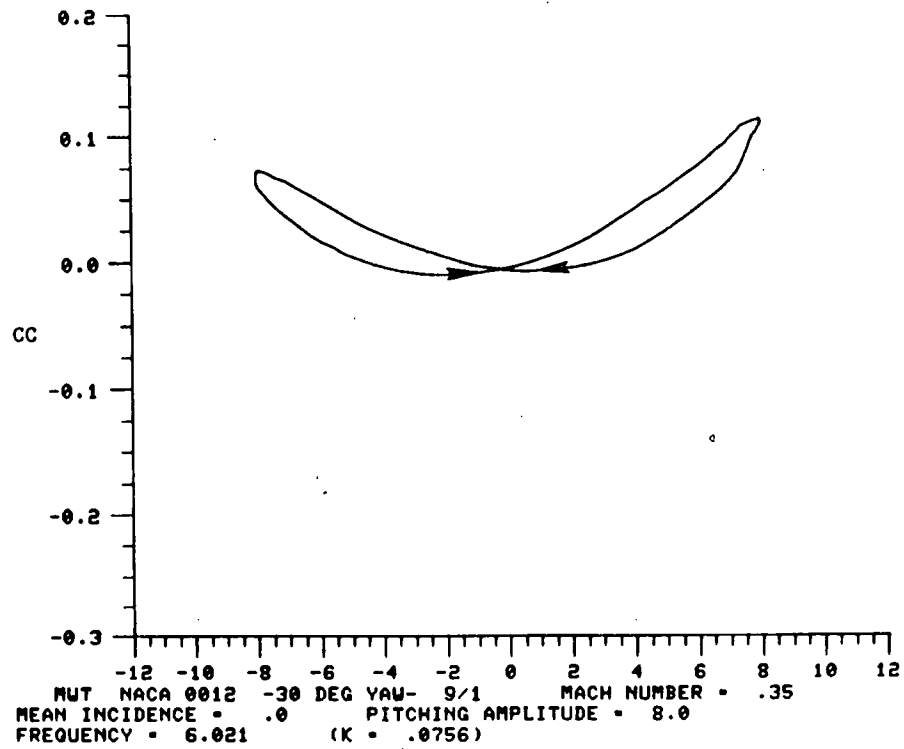
FILE 13. RUN1008.003



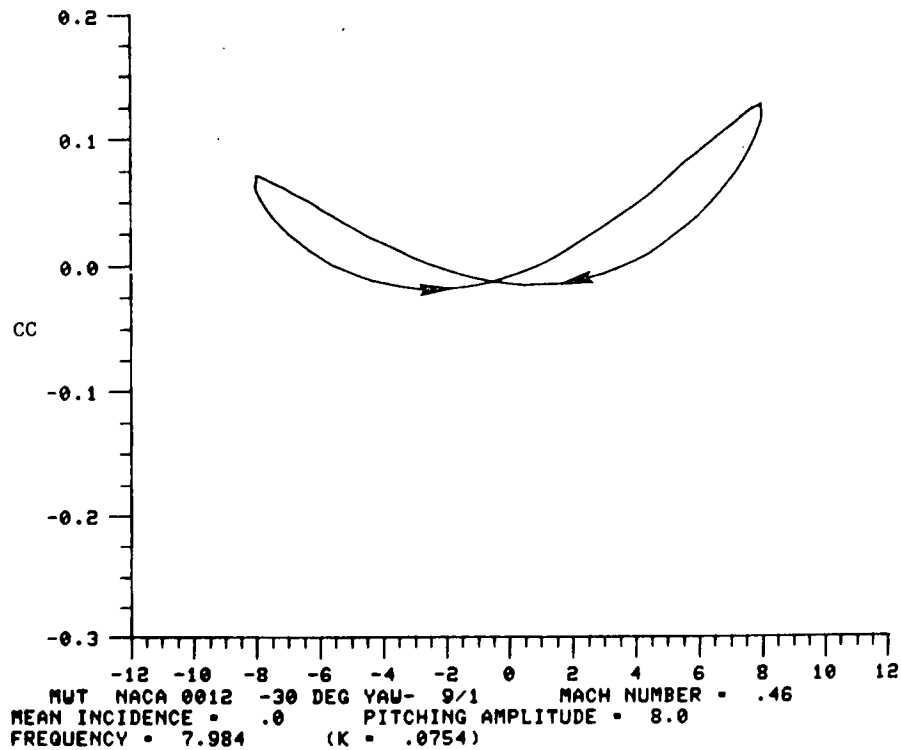
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 9. RUN1007.007



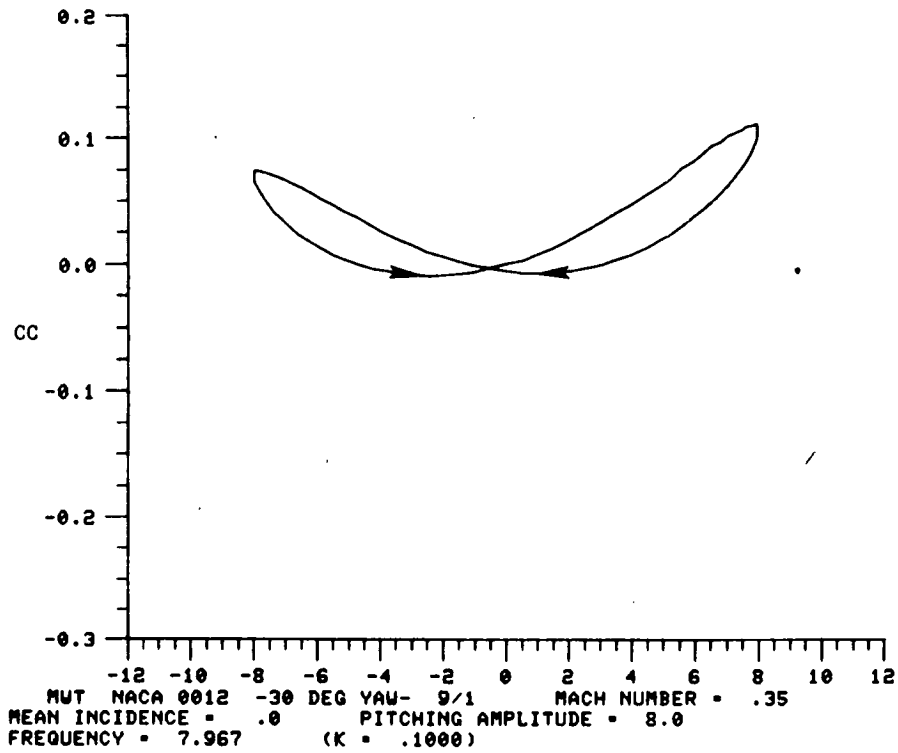
FILE 14. RUN1008.005



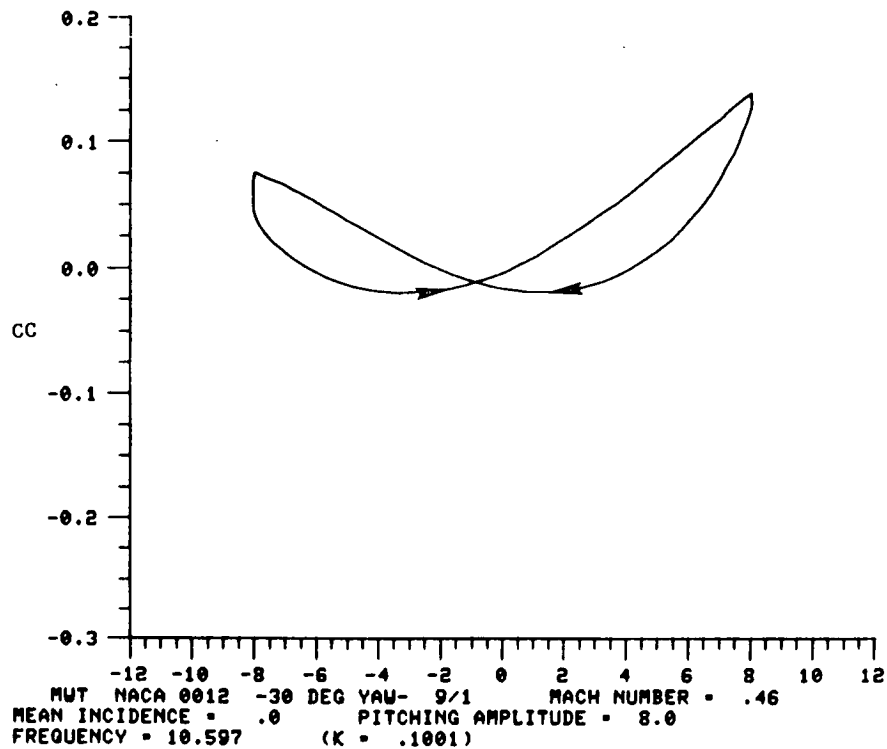
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 10. RUN1007.009



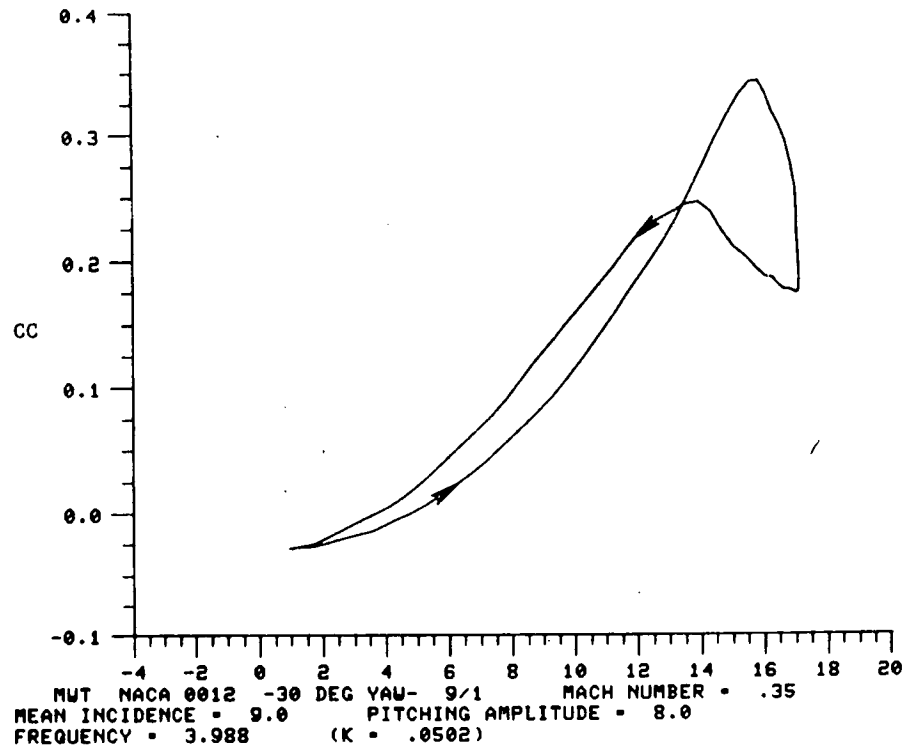
FILE 49. RUN1008.009



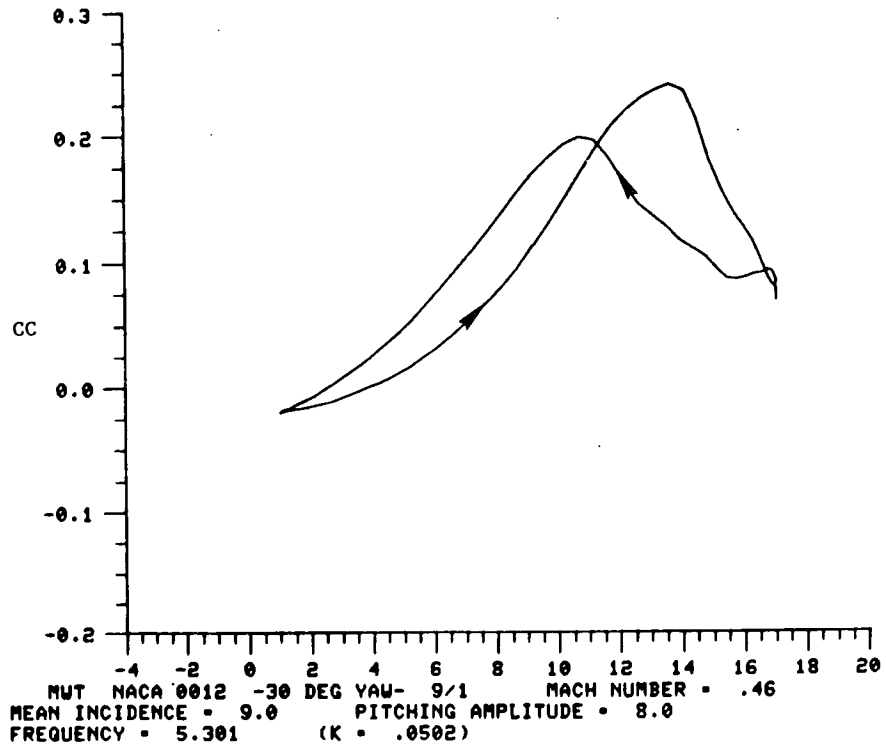
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

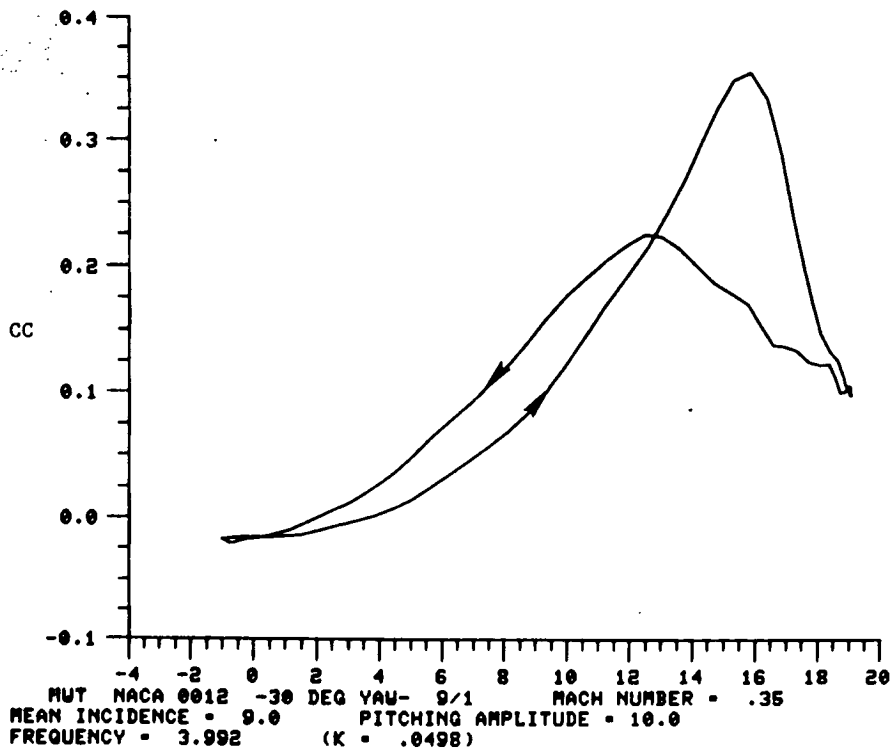
FILE 26. RUN1018.013



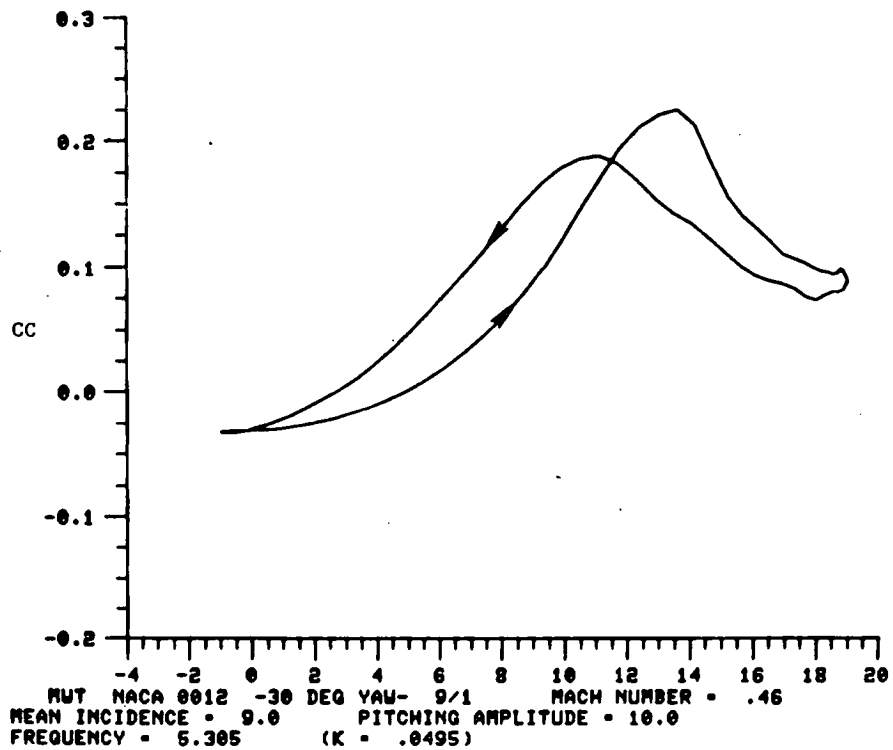
FILE 31. RUN1019.003



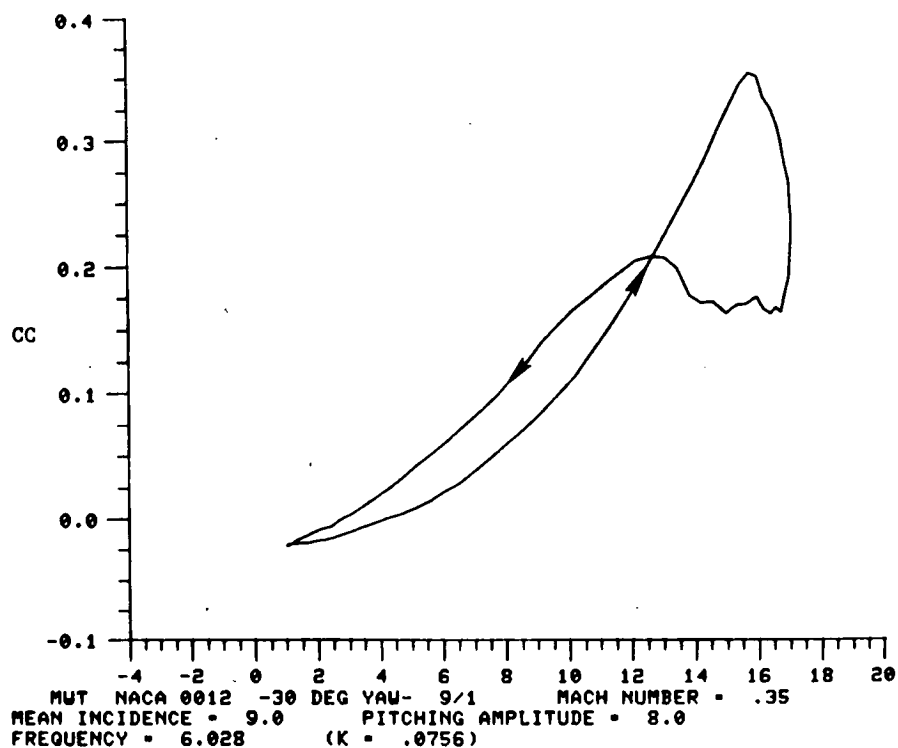
FILE 6. RUN1029.008



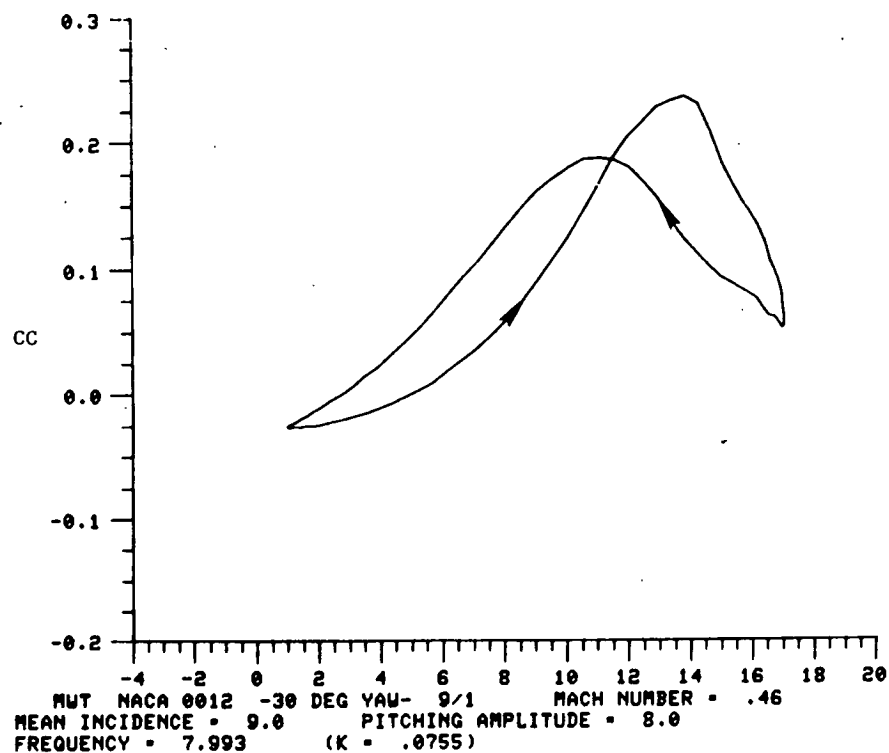
FILE 11. RUN1030.003



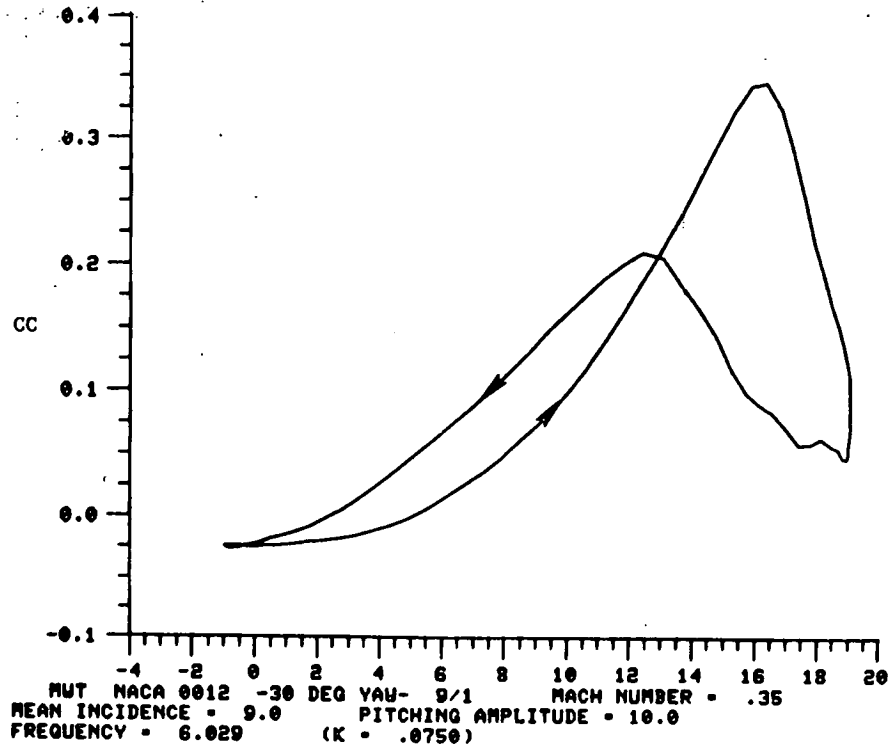
FILE 27. RUN1018.015



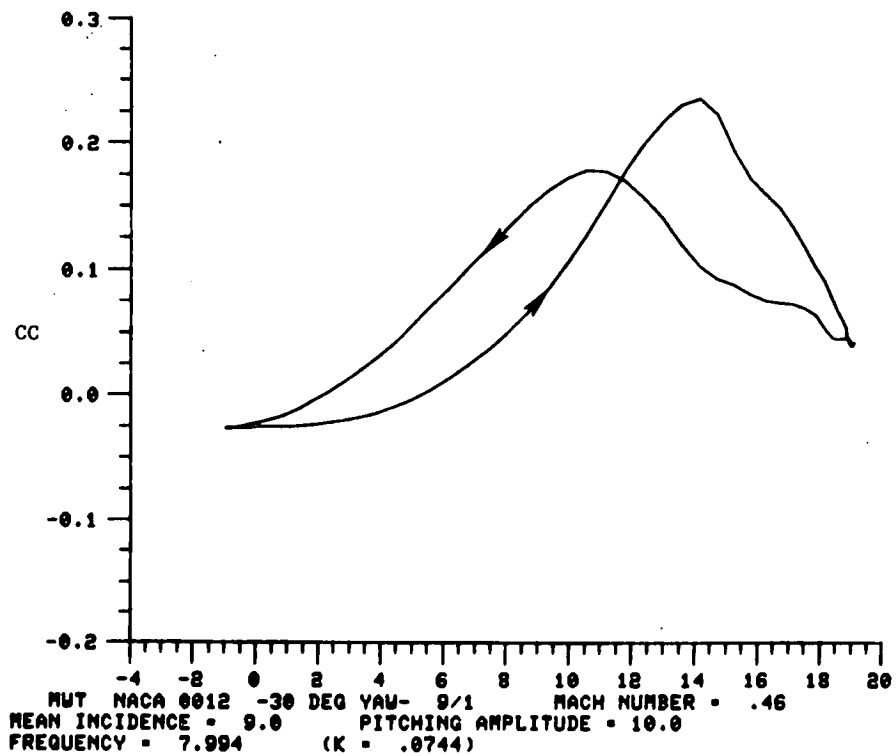
FILE 32. RUN1019.005



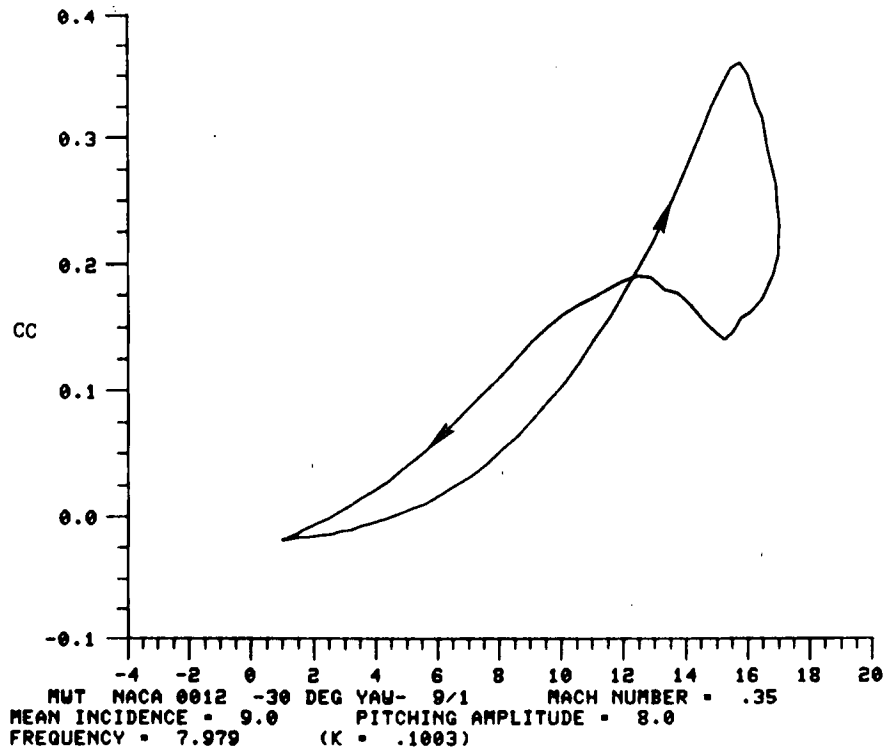
FILE 7. RUN1029.010



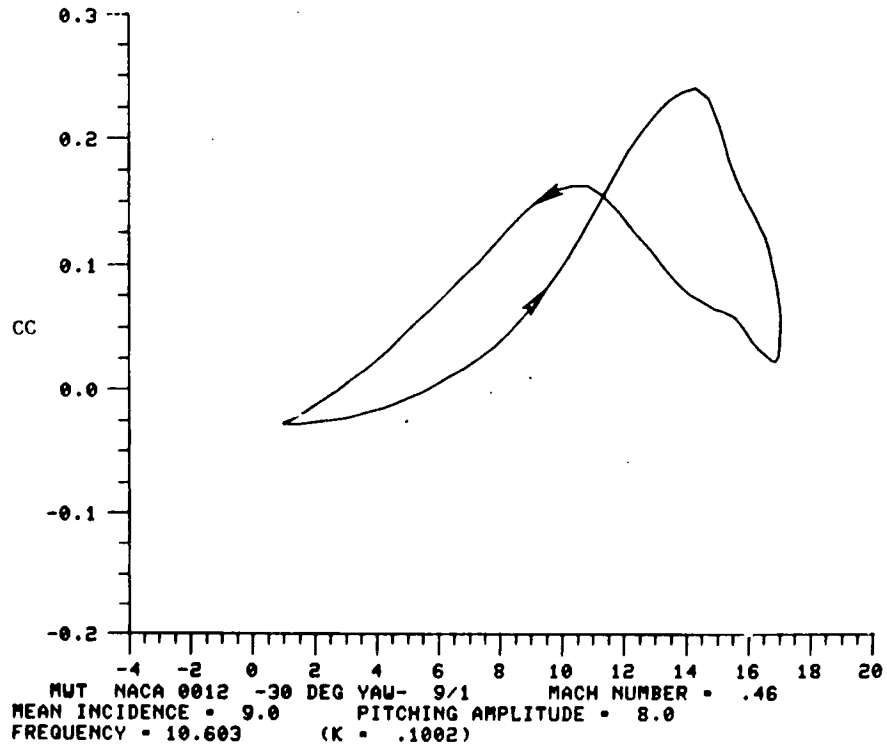
FILE 12. RUN1030.005



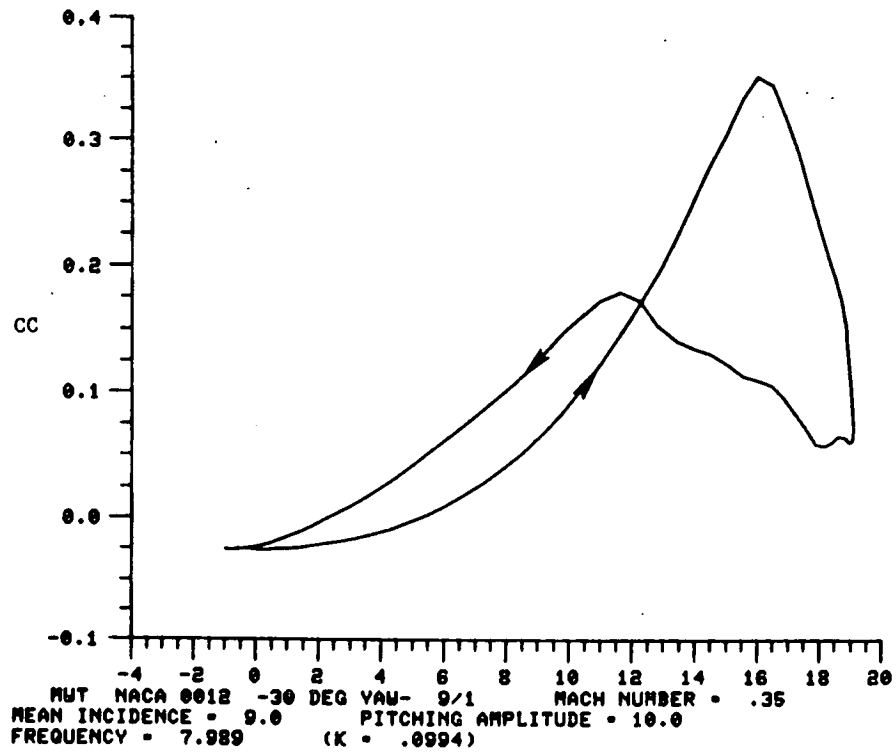
FILE 28. RUN1018.017



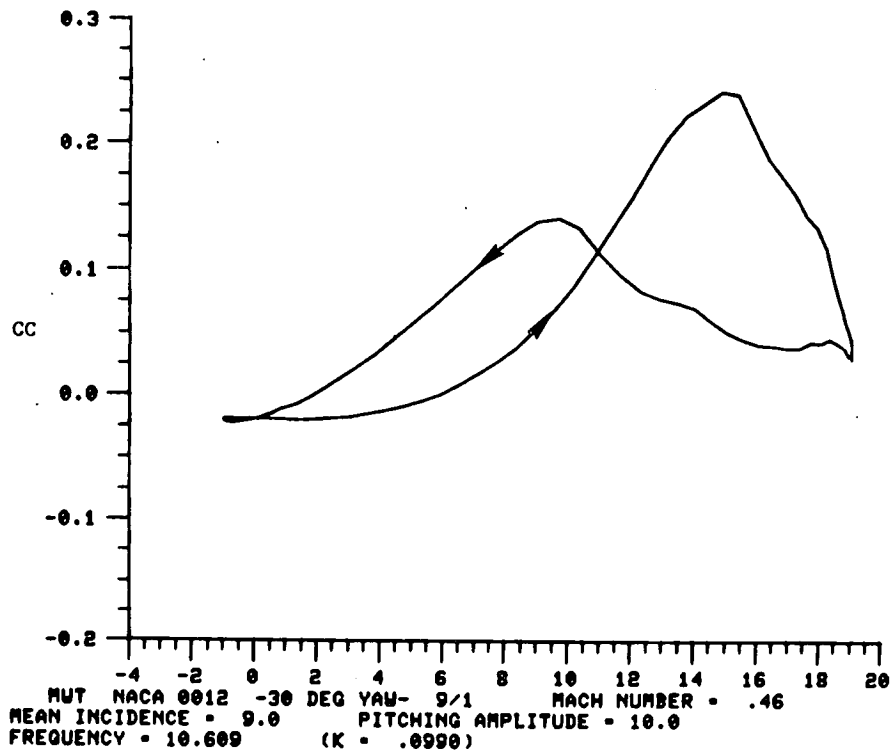
FILE 34. RUN1019.009



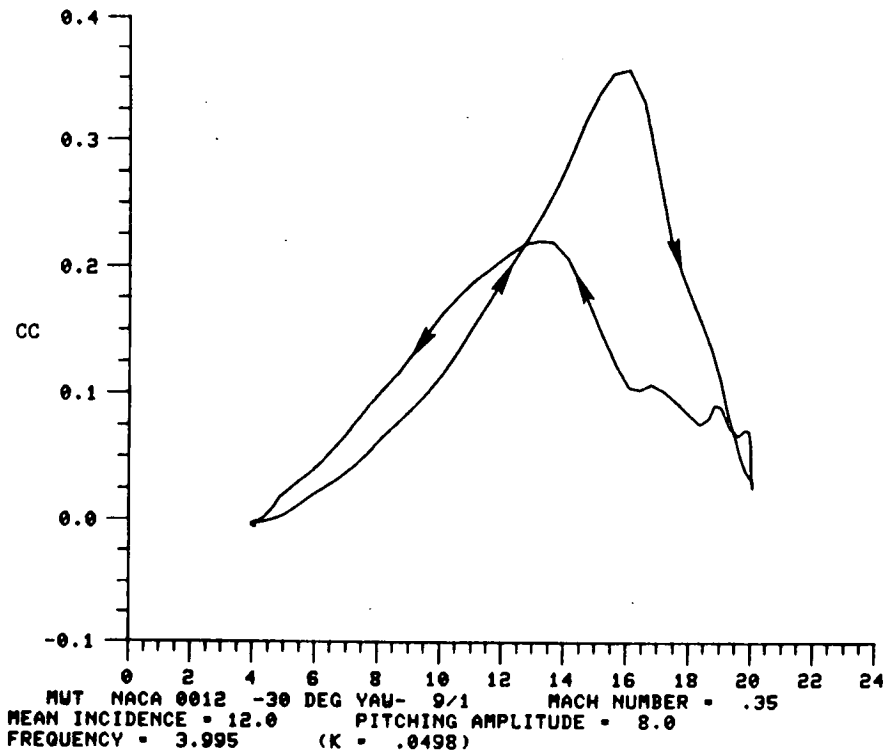
FILE 8. RUN1029.012



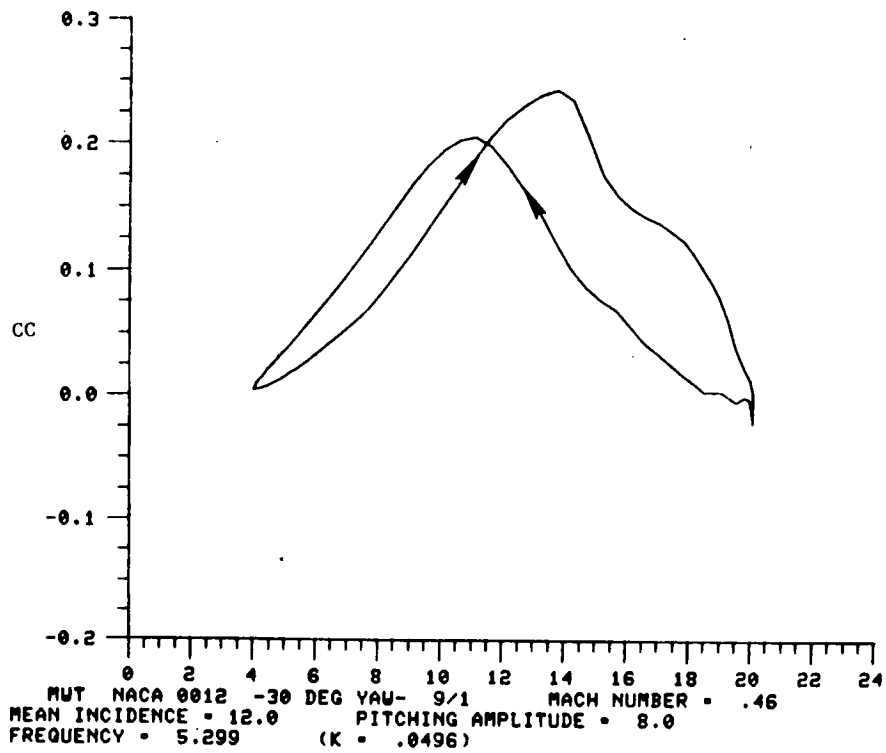
FILE 14. RUN1030.009



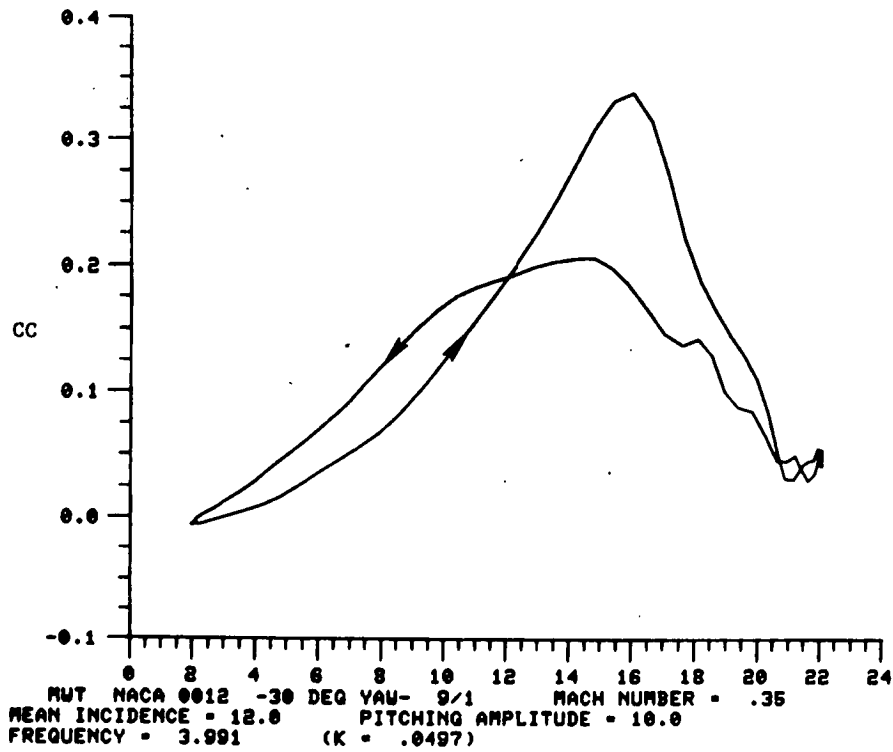
FILE 53. RUN1016.004



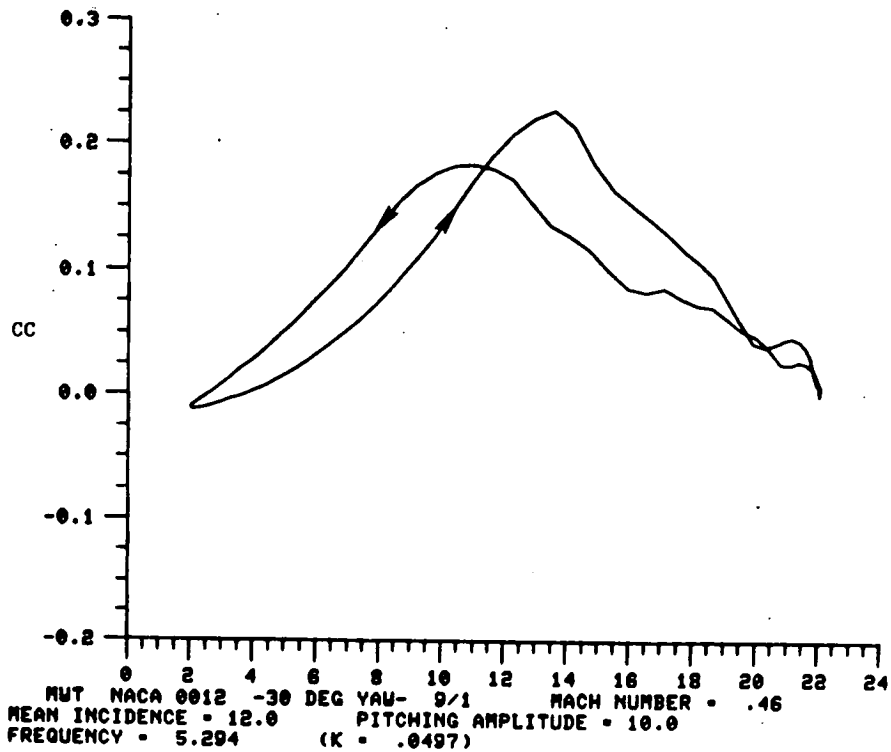
FILE 56. RUN1017.003



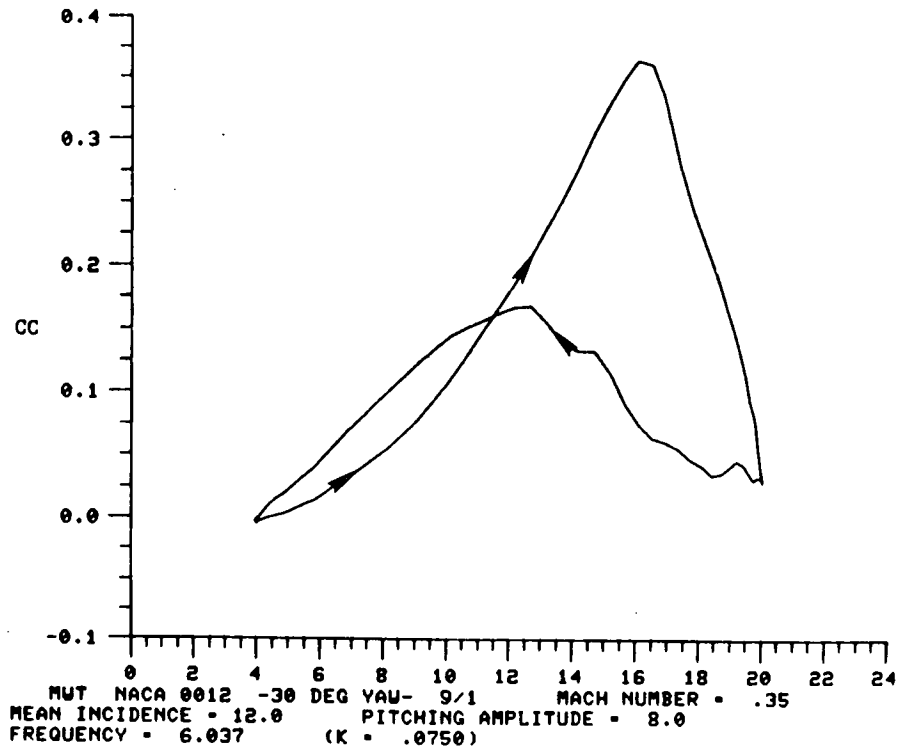
FILE 39. RUN1033.008



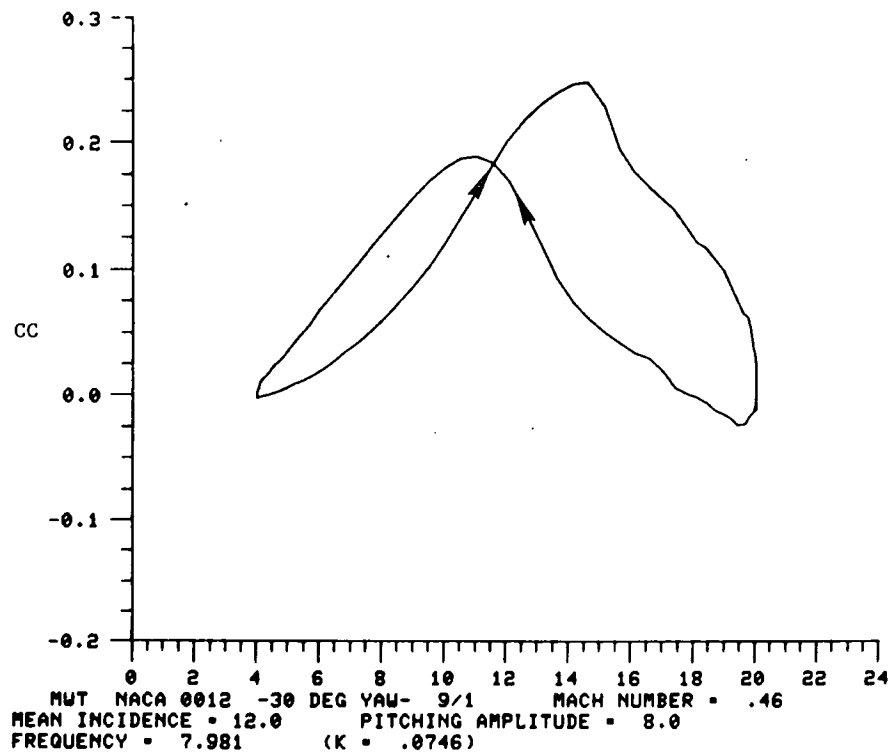
FILE 44. RUN1034.003



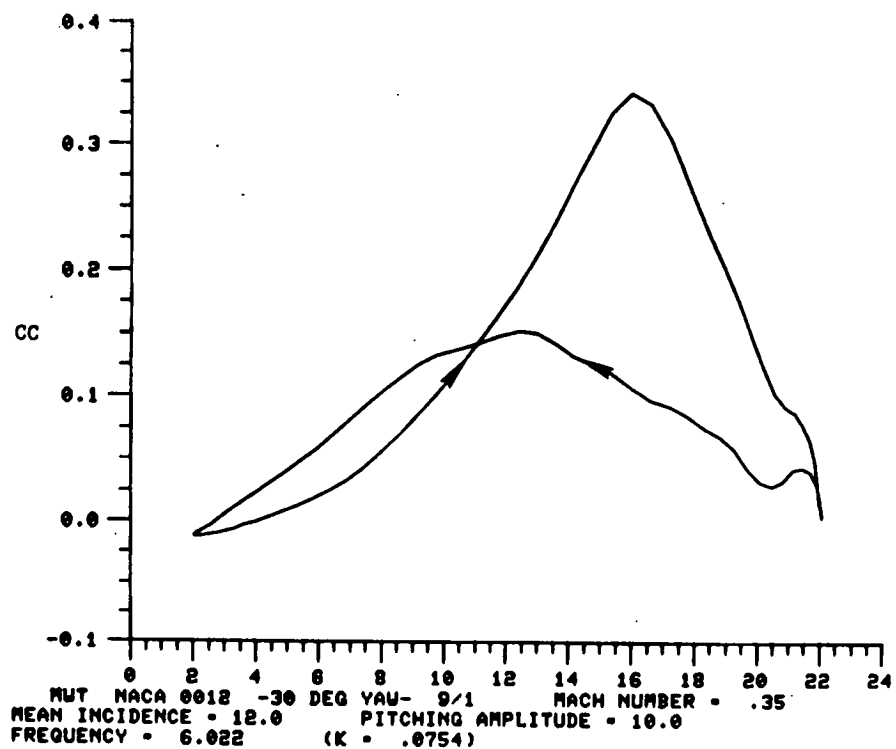
FILE 18. RUN1016.008



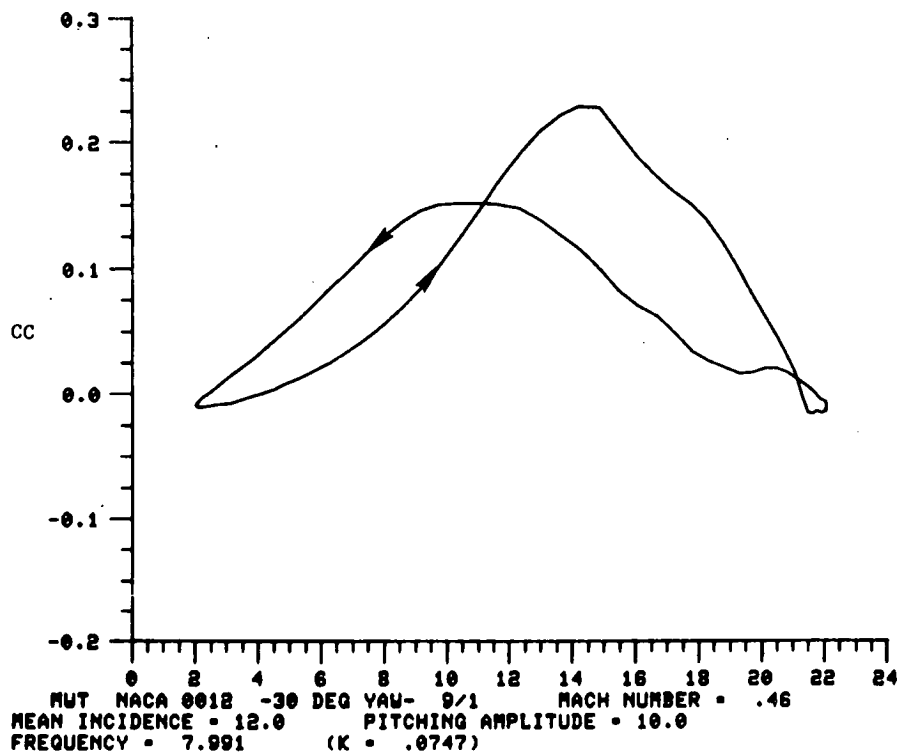
FILE 57. RUN1017.005



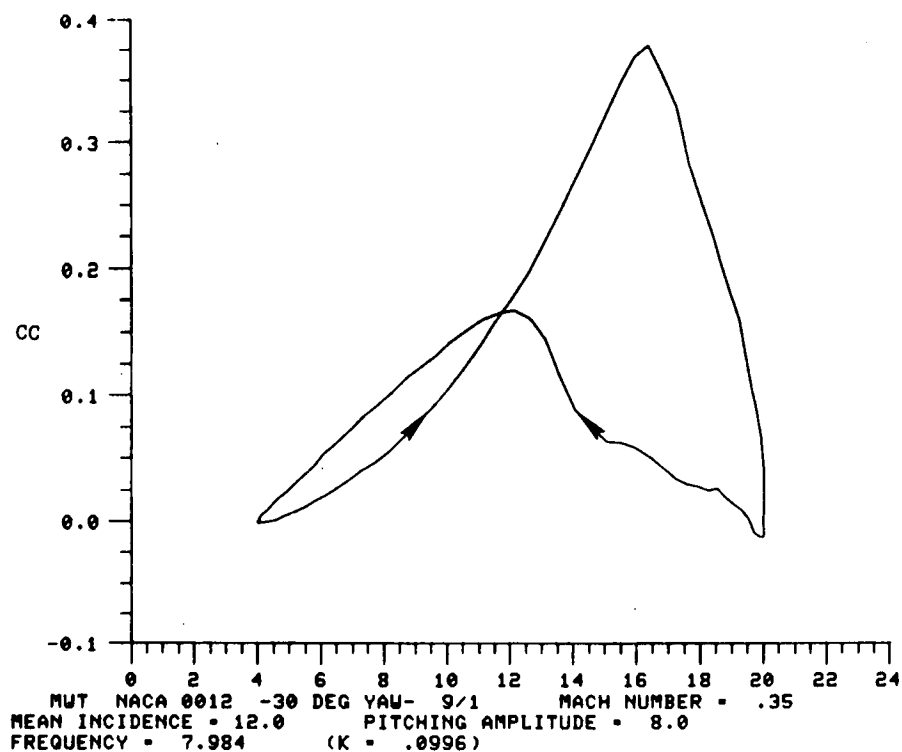
FILE 40. RUN1033.010



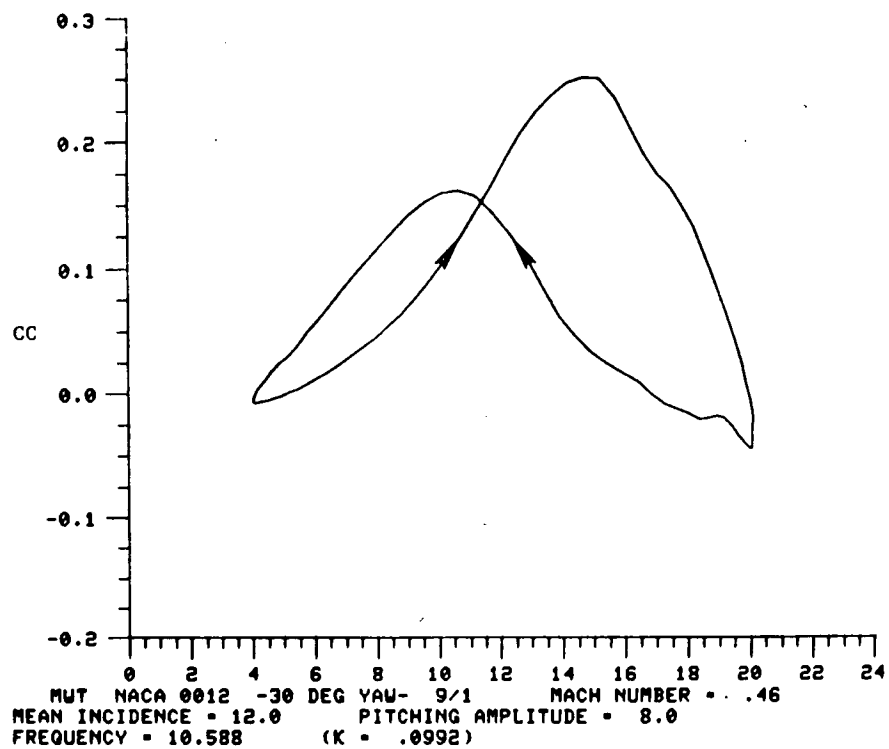
FILE 45. RUN1034.005



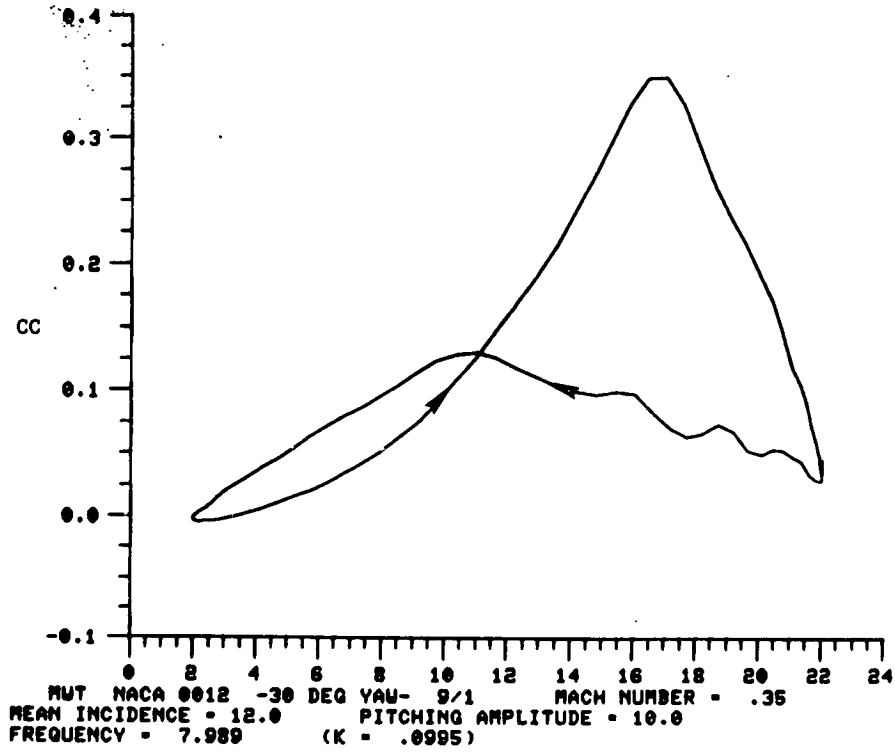
FILE 19. RUN1016.010



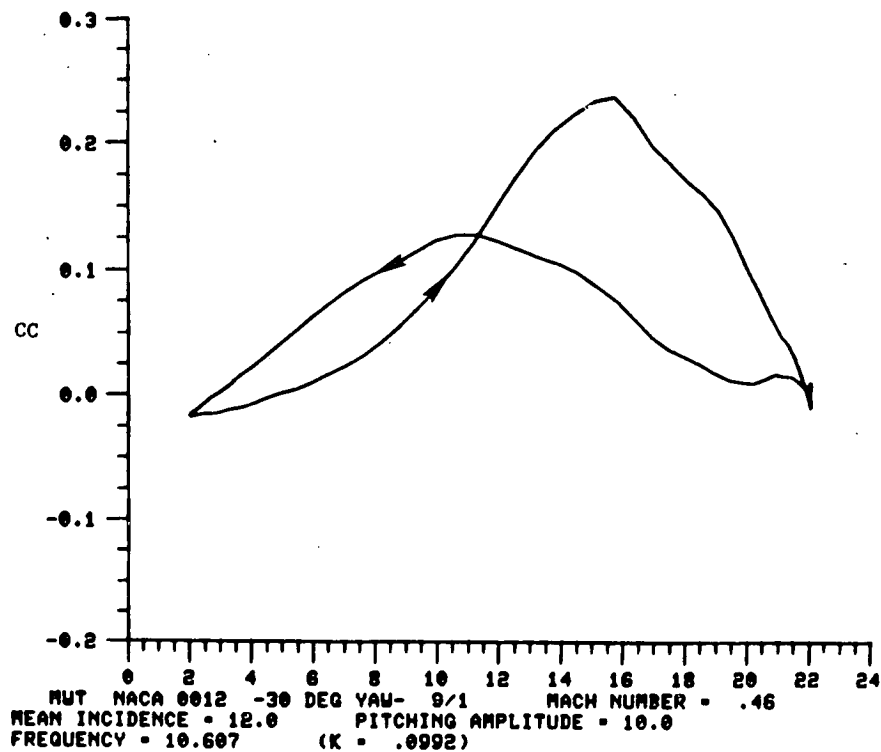
FILE 58. RUN1017.009



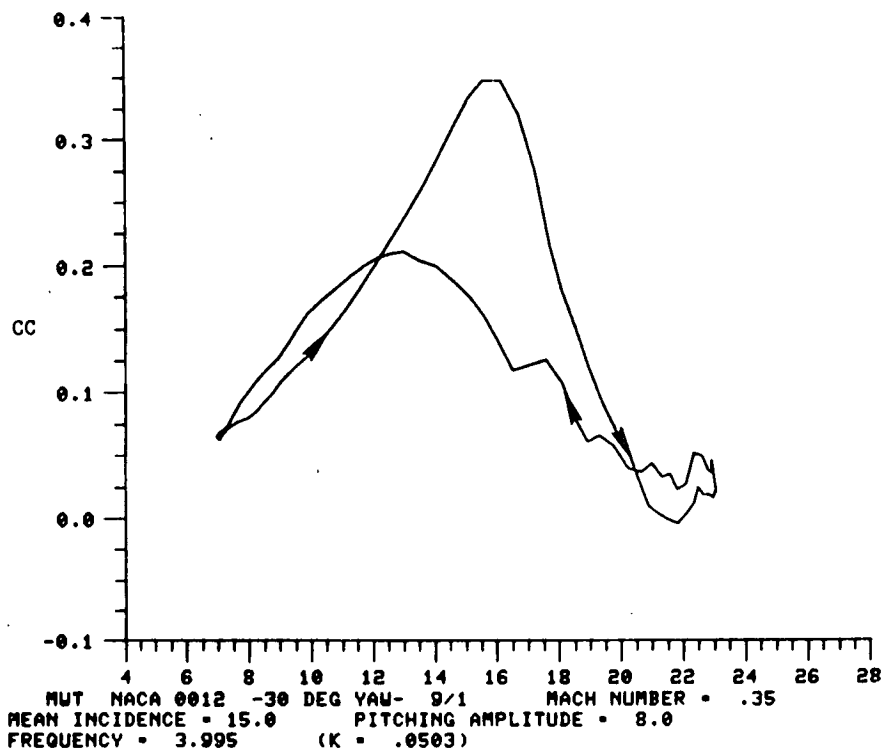
FILE 41. RUN1033.012



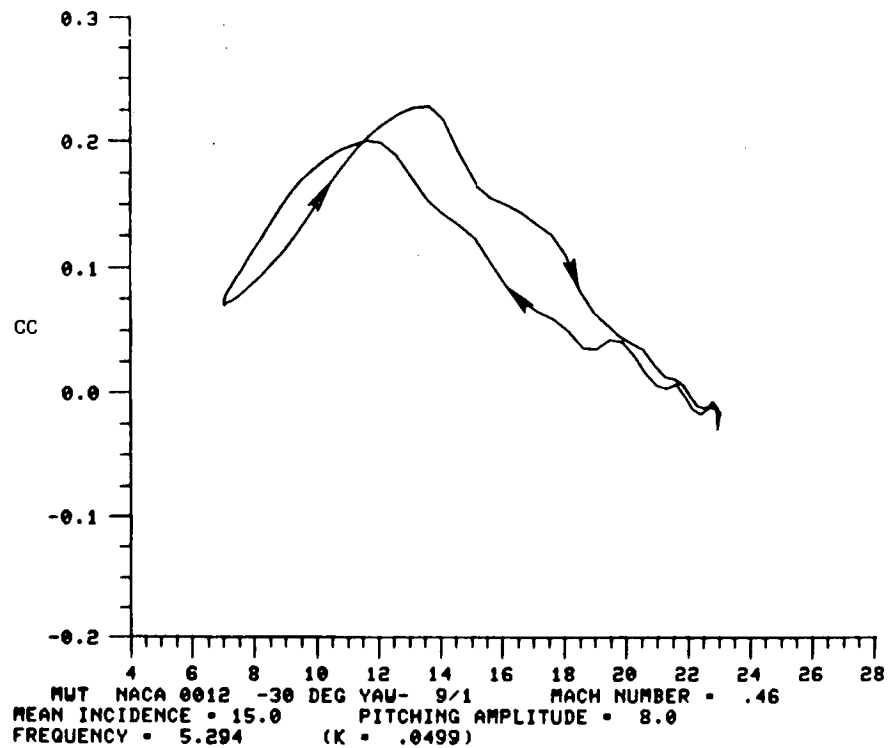
FILE 47. RUN1034.009



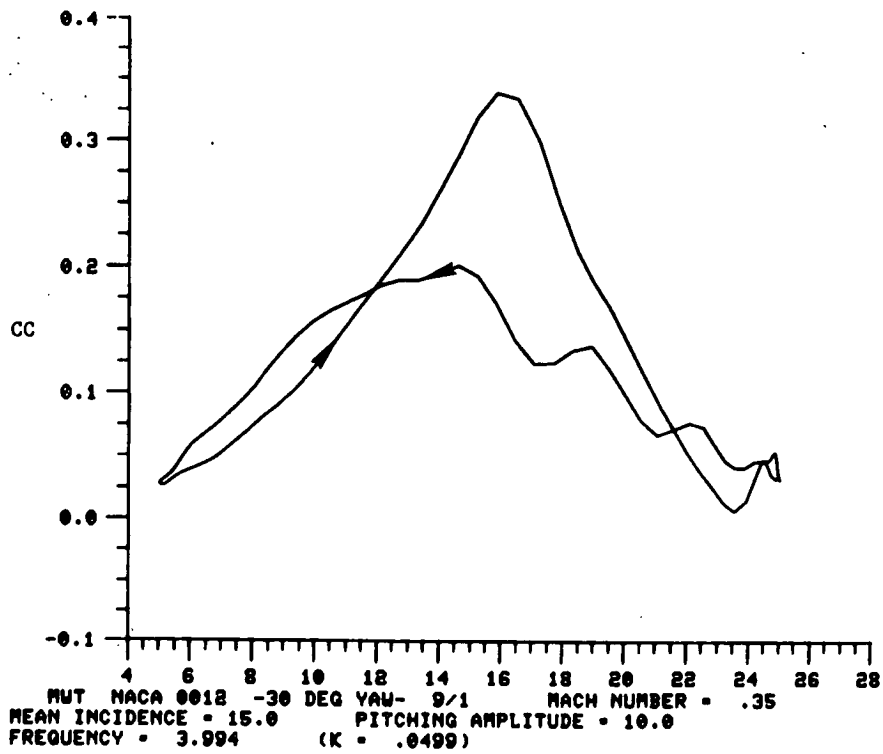
FILE 35. RUN1020.008



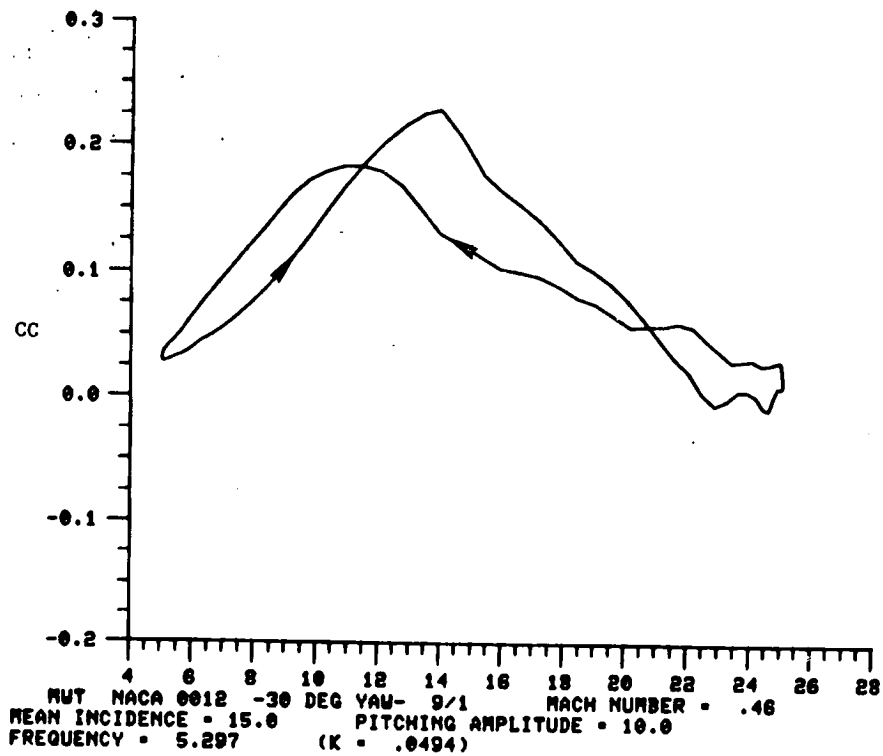
FILE 40. RUN1021.003



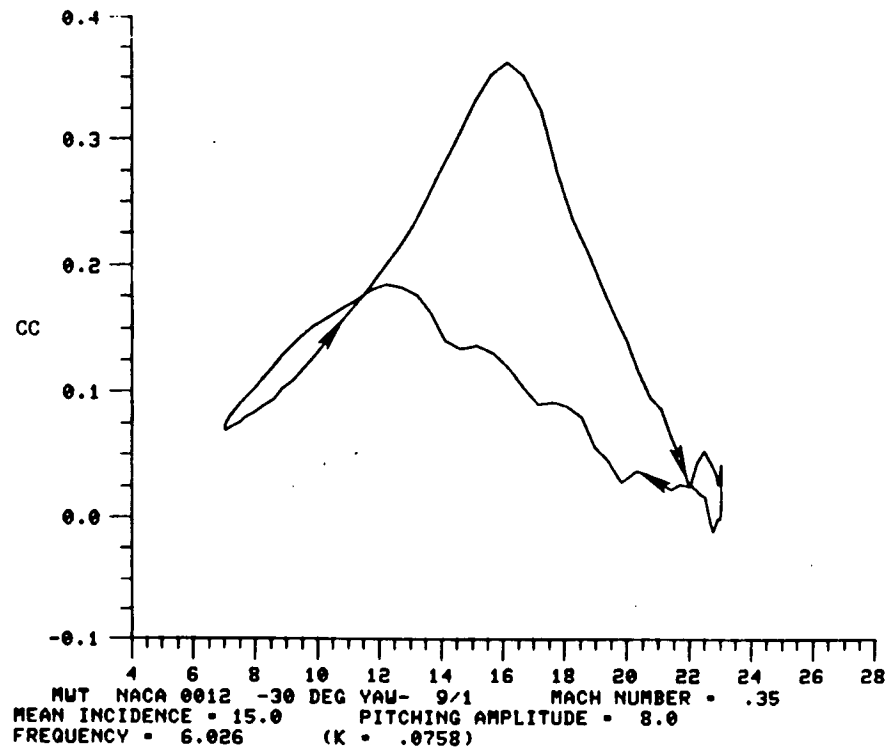
FILE 53. RUN1036.001



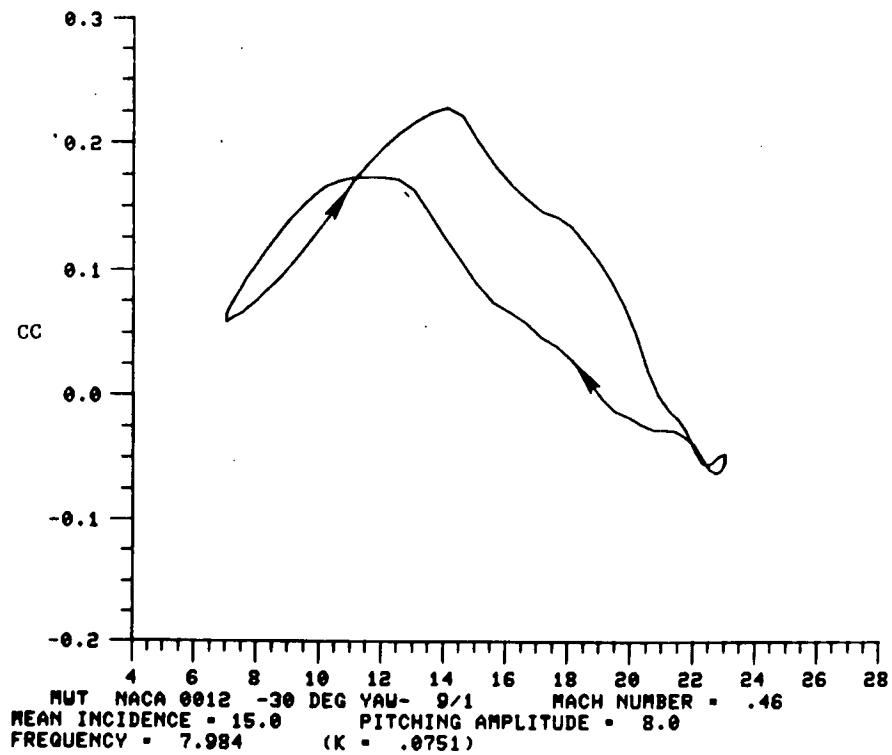
FILE 58. RUN1037.003



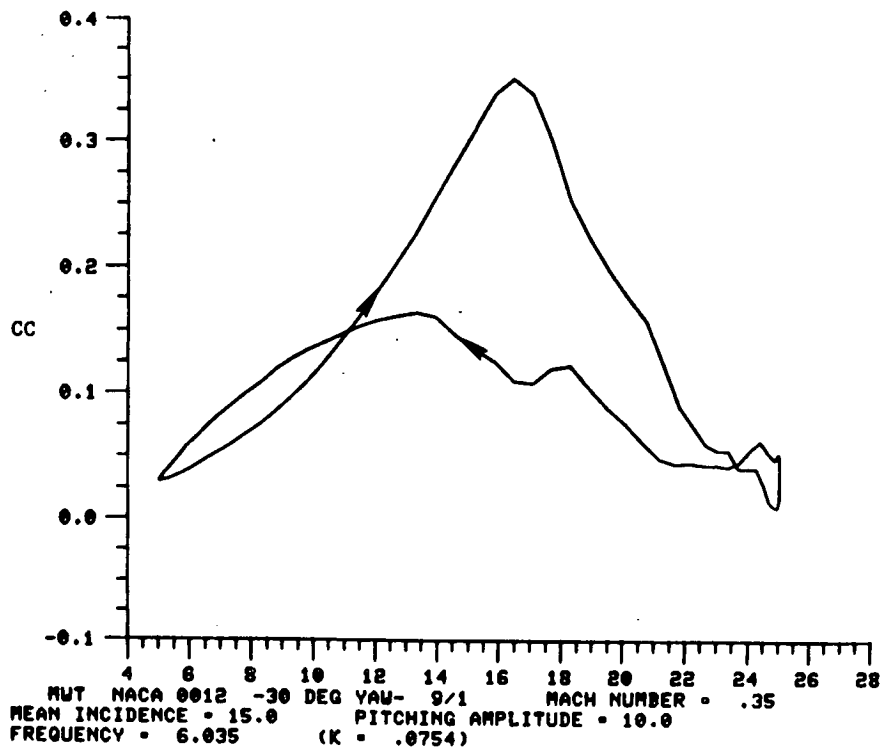
FILE 36. RUN1020.010



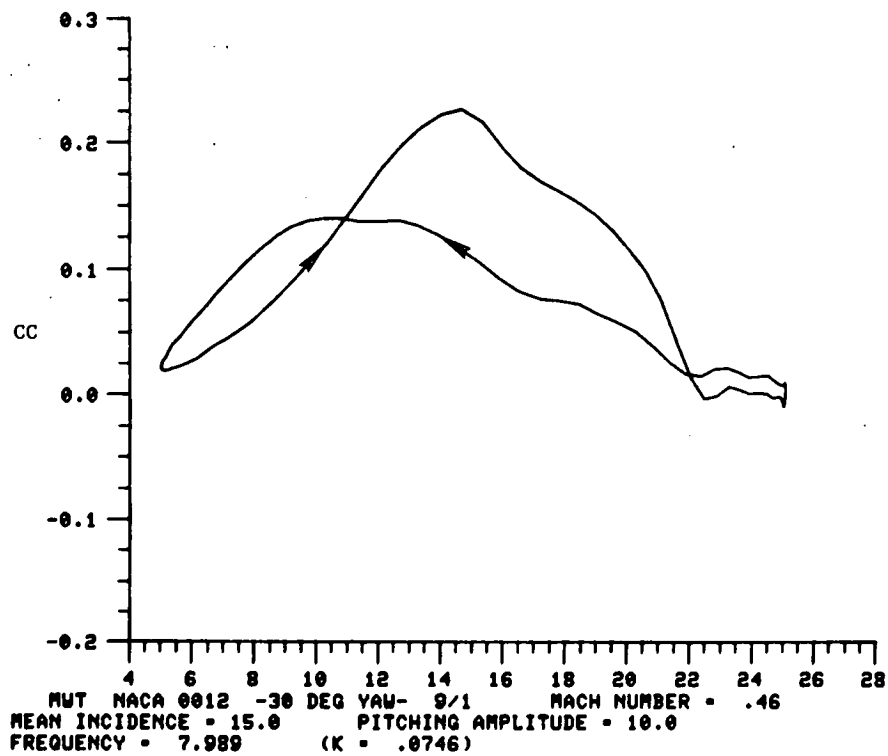
FILE 63. RUN1021.005



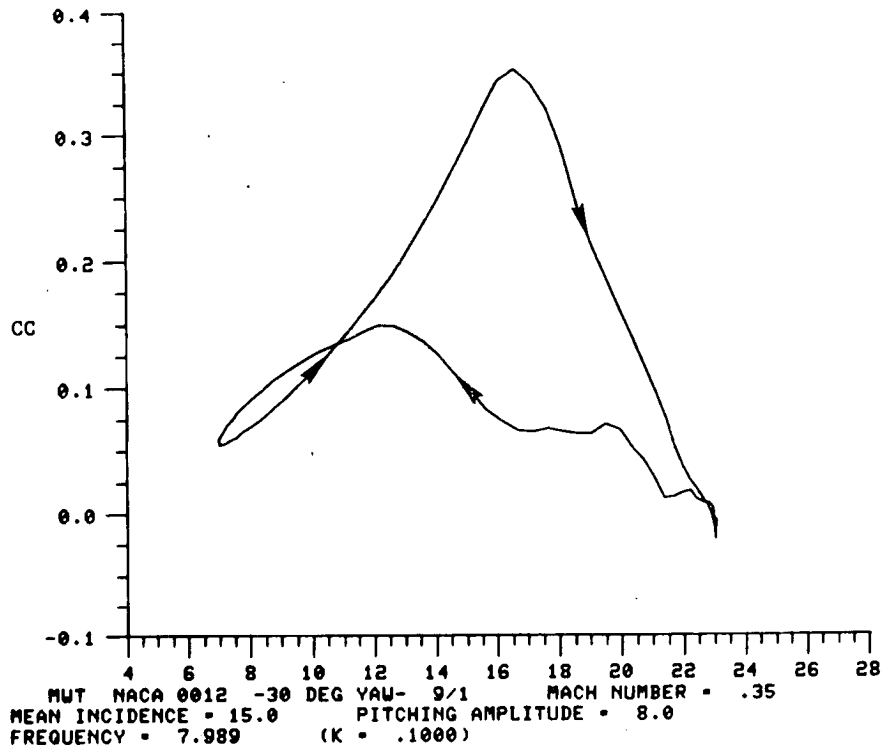
FILE 54. RUN1036.003



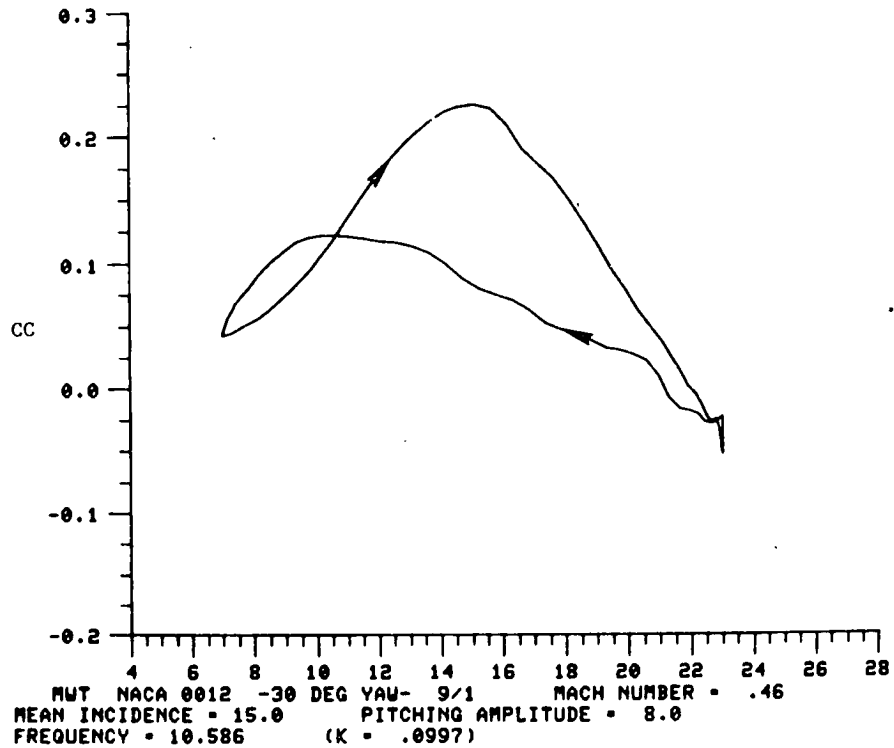
FILE 59. RUN1037.005



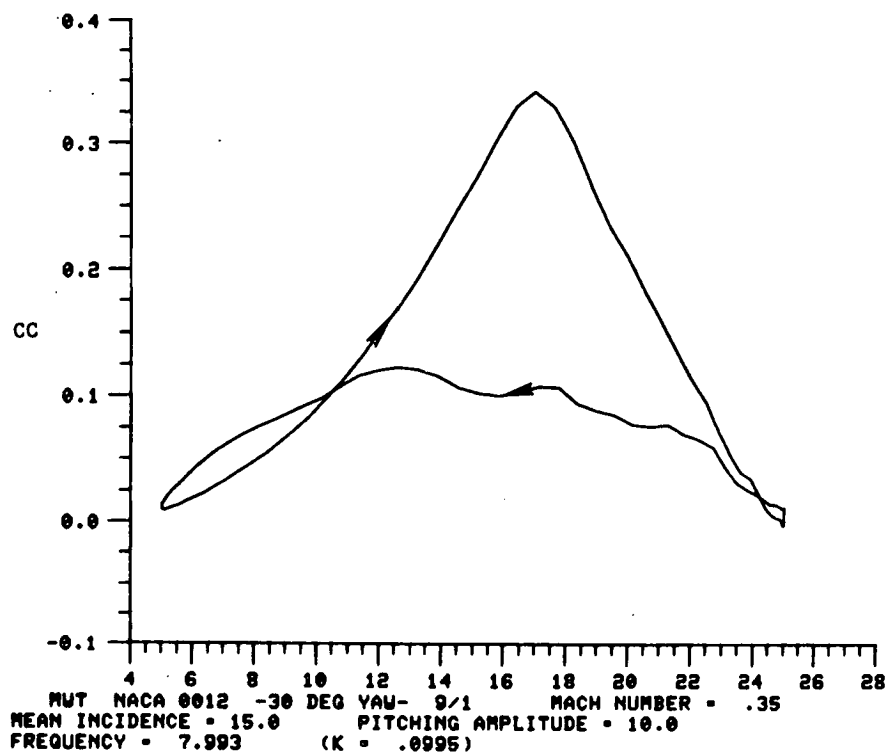
FILE 37. RUN1020.012



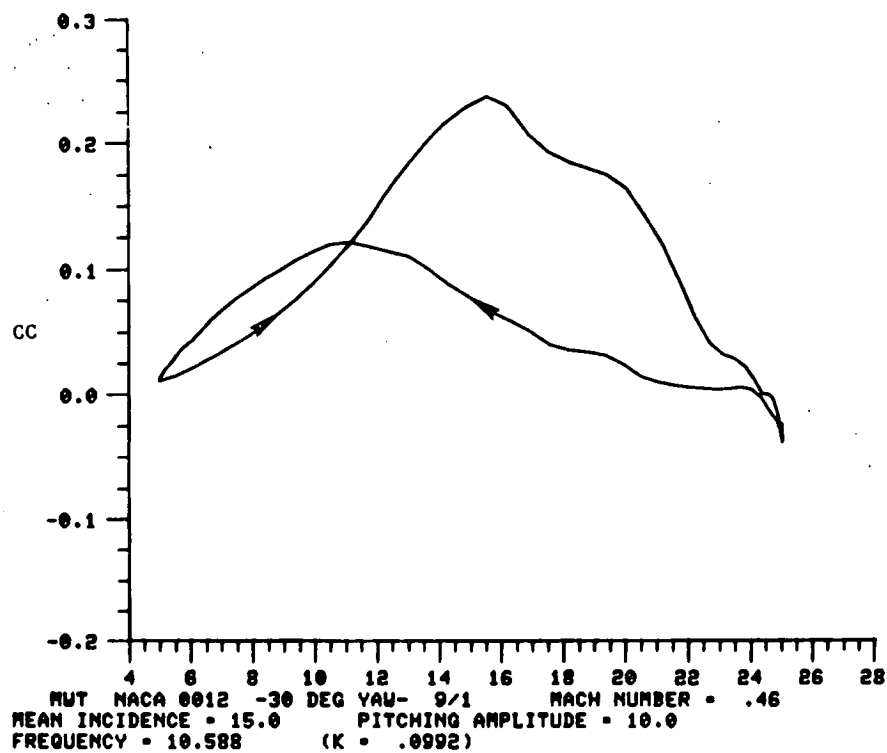
FILE 65. RUN1021.010



FILE 55. RUN1036.005



FILE 61. RUN1037.009

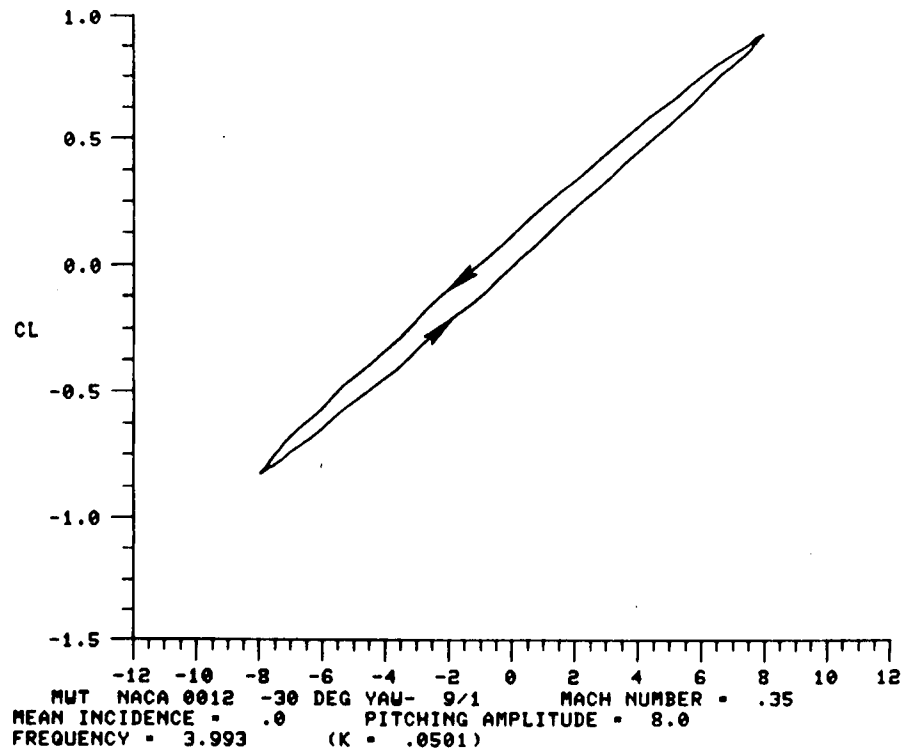


EFFECT OF MACH NUMBER ON THE SWEPT WING LIFT FORCE RESPONSE *

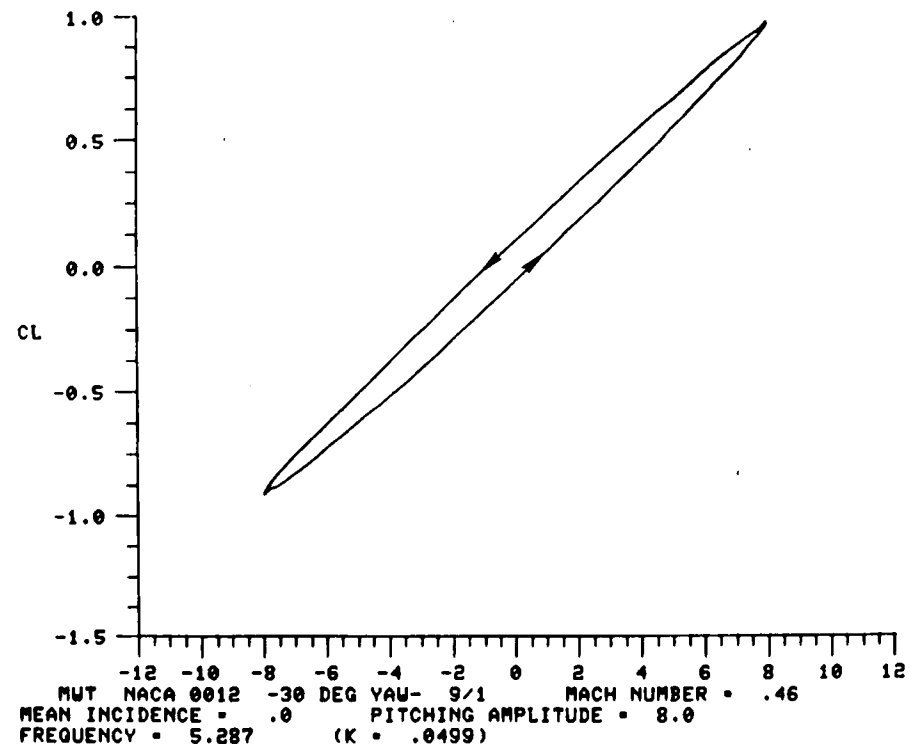
<u>Mean Incidence Angle</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0	.050	310,311
↓	.075	312,313
↓	.100	314,415
9	.050	316,317
↓	.075	318,319
↓	.100	320,321
12	.050	322,323
↓	.075	324,325
↓	.100	326,327
15	.050	328,329
↓	.075	330,331
↓	.100	332,333

* The effect of Mach number is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

FILE 8. RUN1007.005



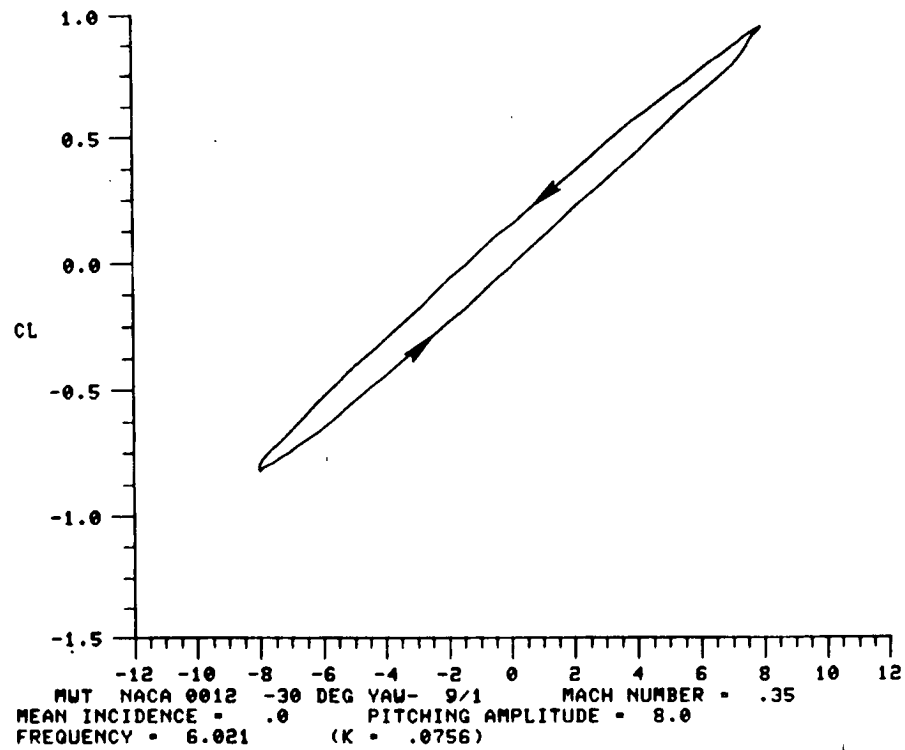
FILE 13. RUN1008.003



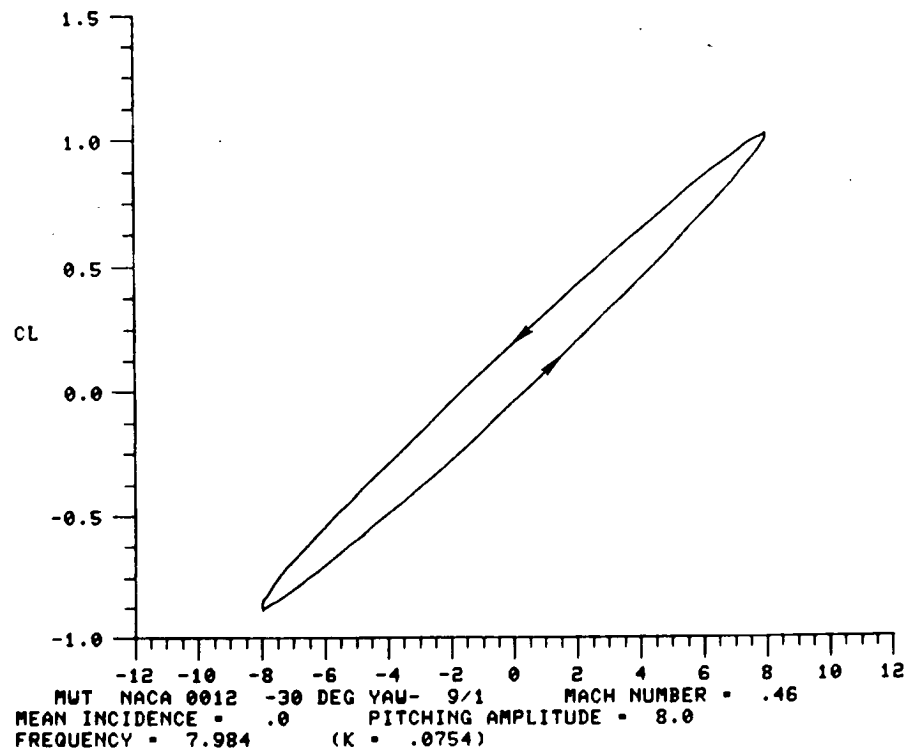
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 9. RUN1007.007



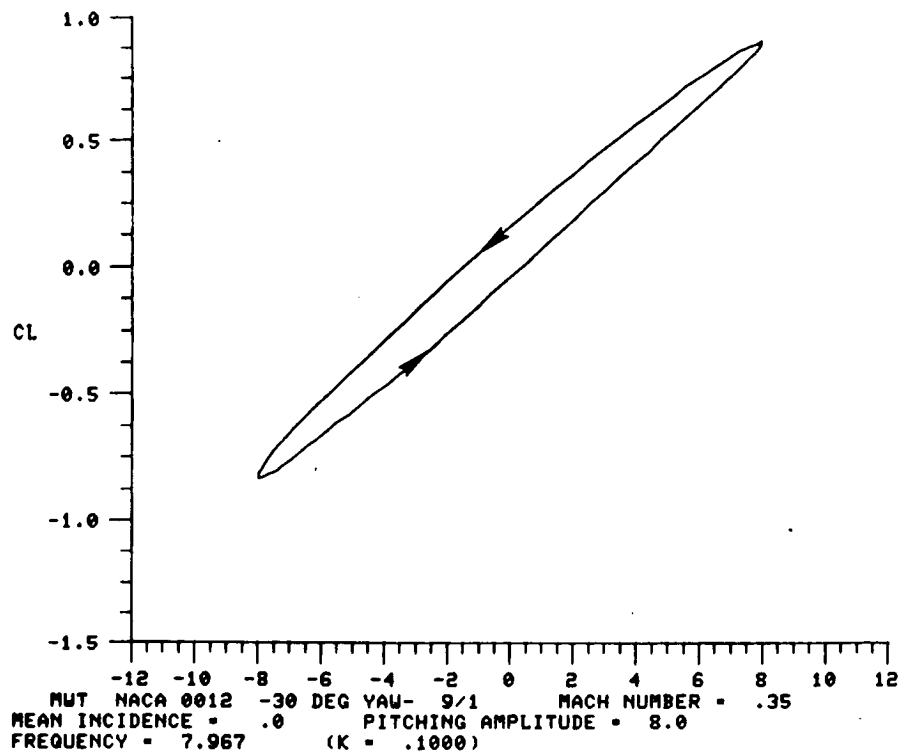
FILE 14. RUN1008.005



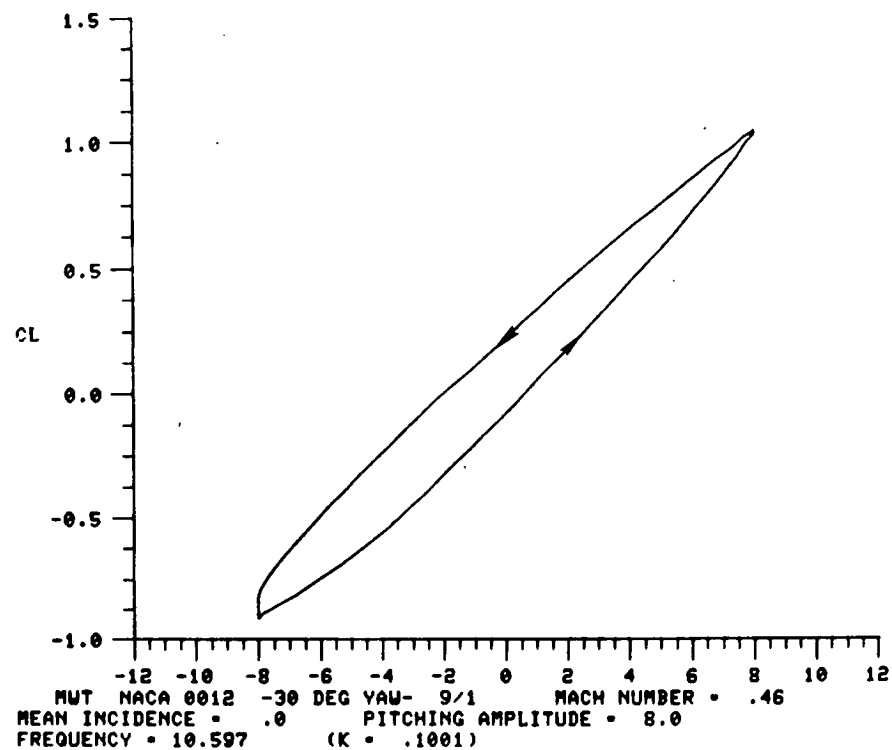
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 10. RUN1007.009



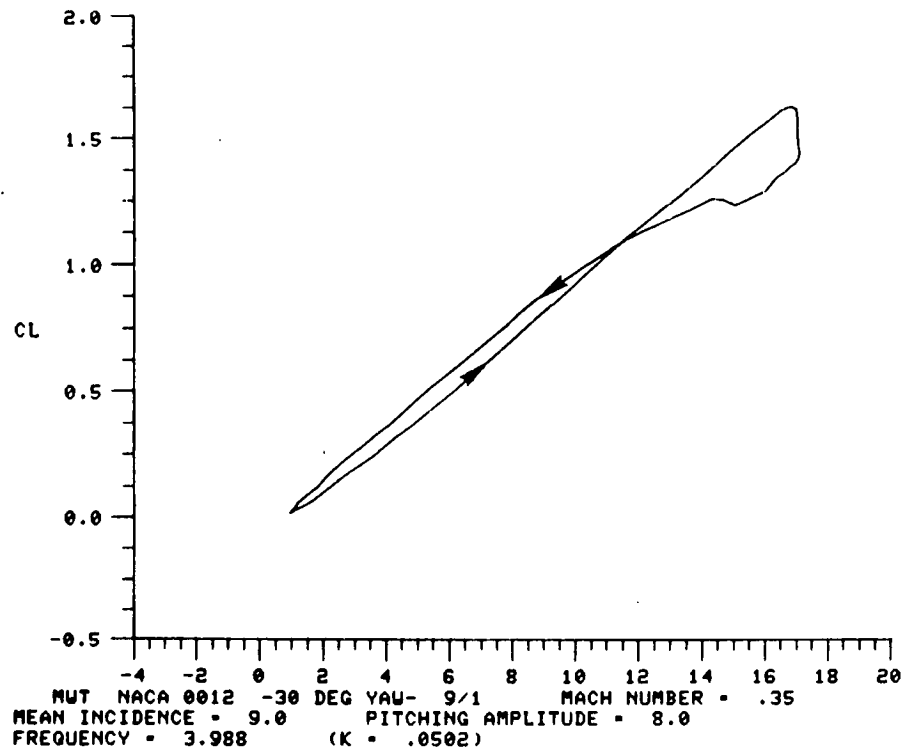
FILE 49. RUN1008.009



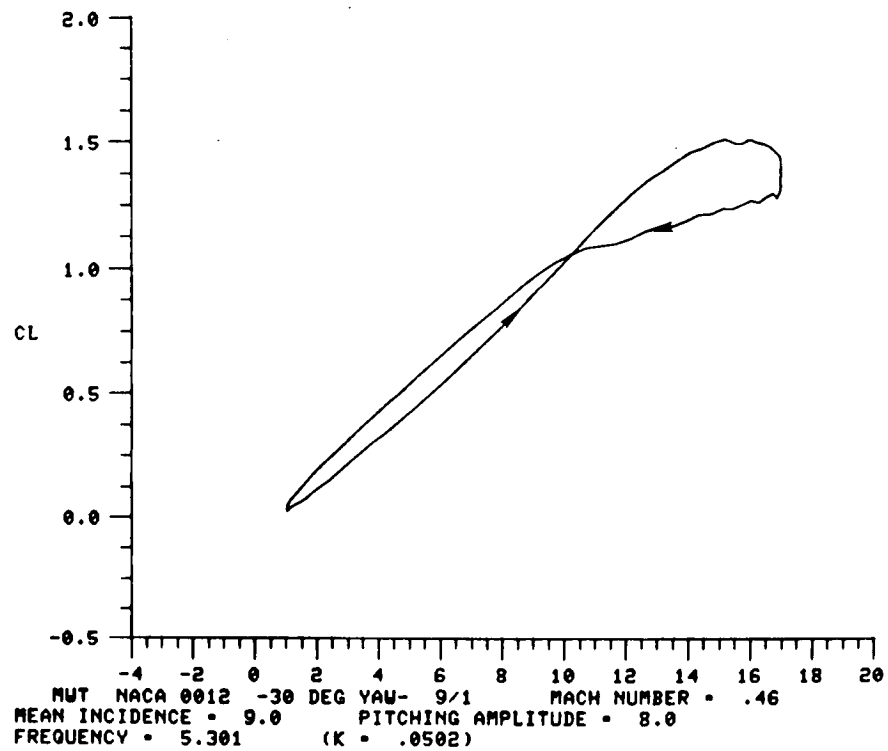
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

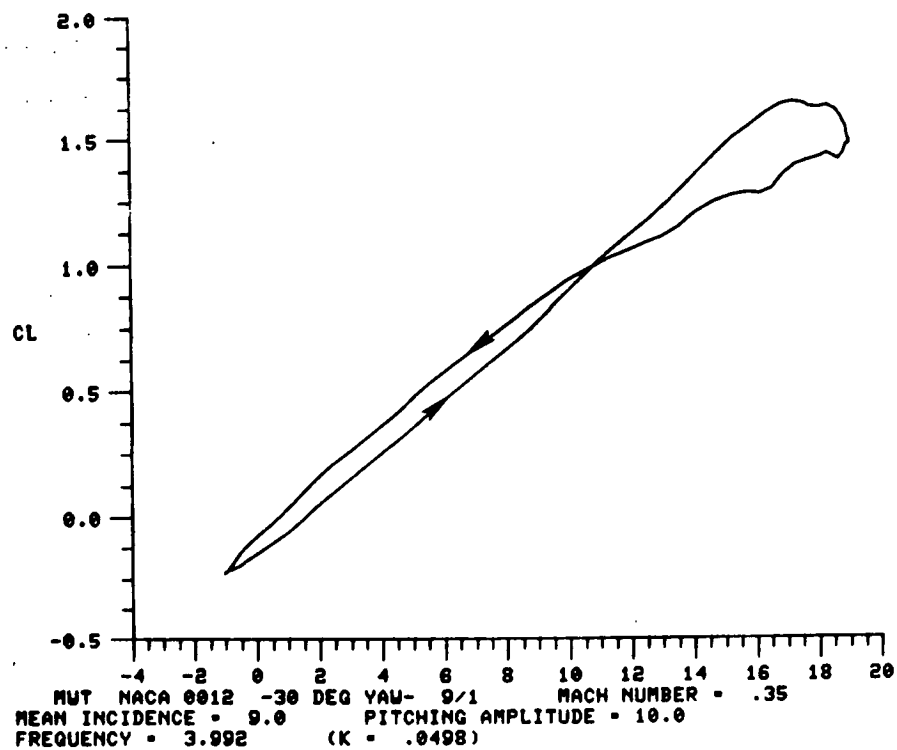
FILE 26. RUN1018.013



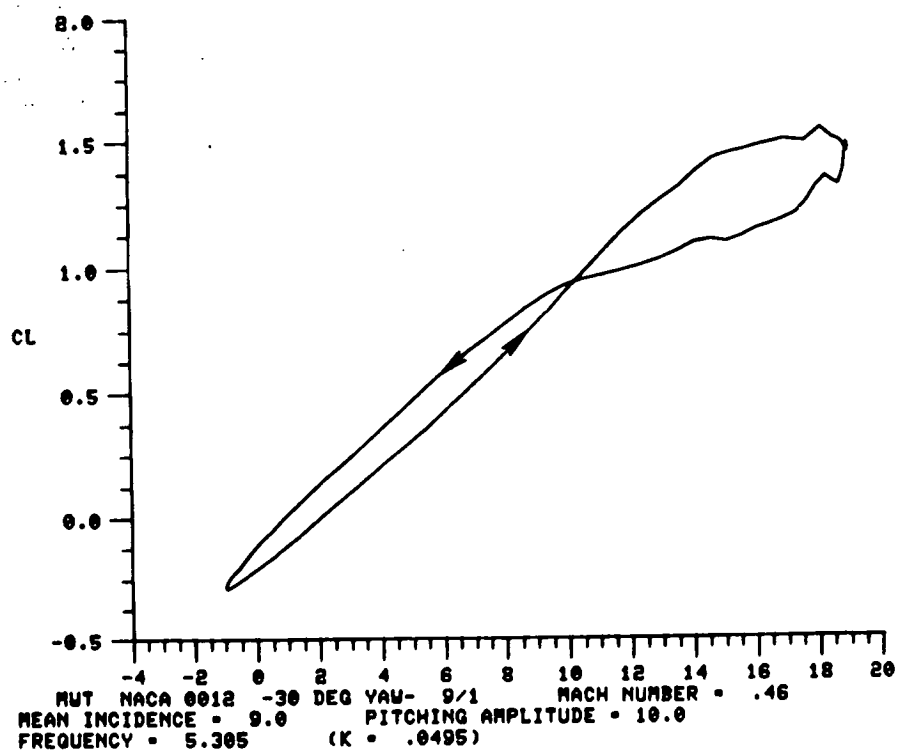
FILE 31. RUN1019.003



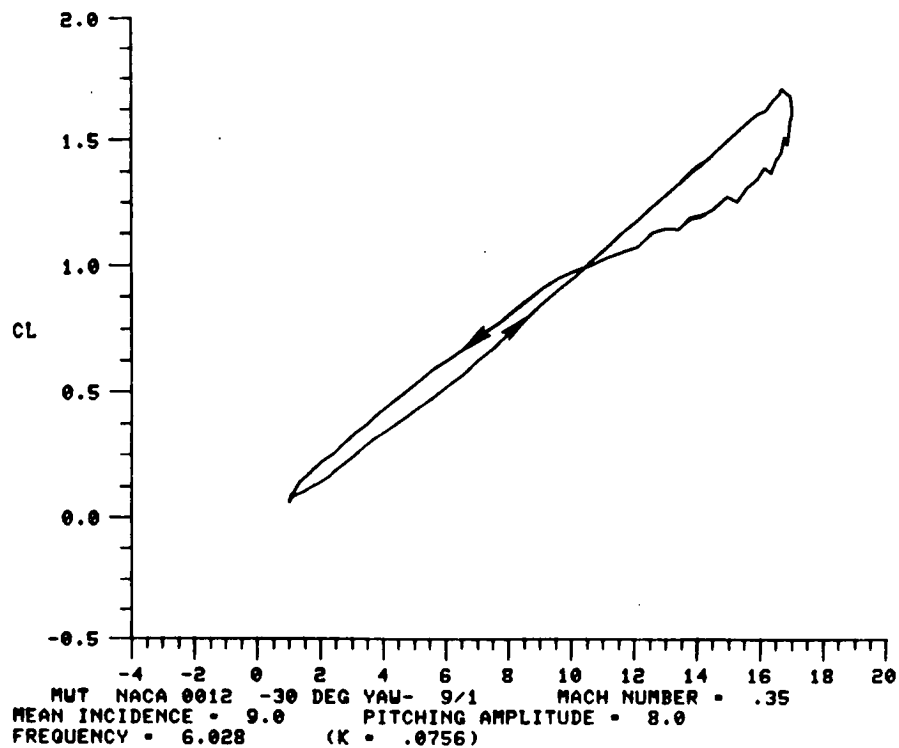
FILE 6. RUN1029.008



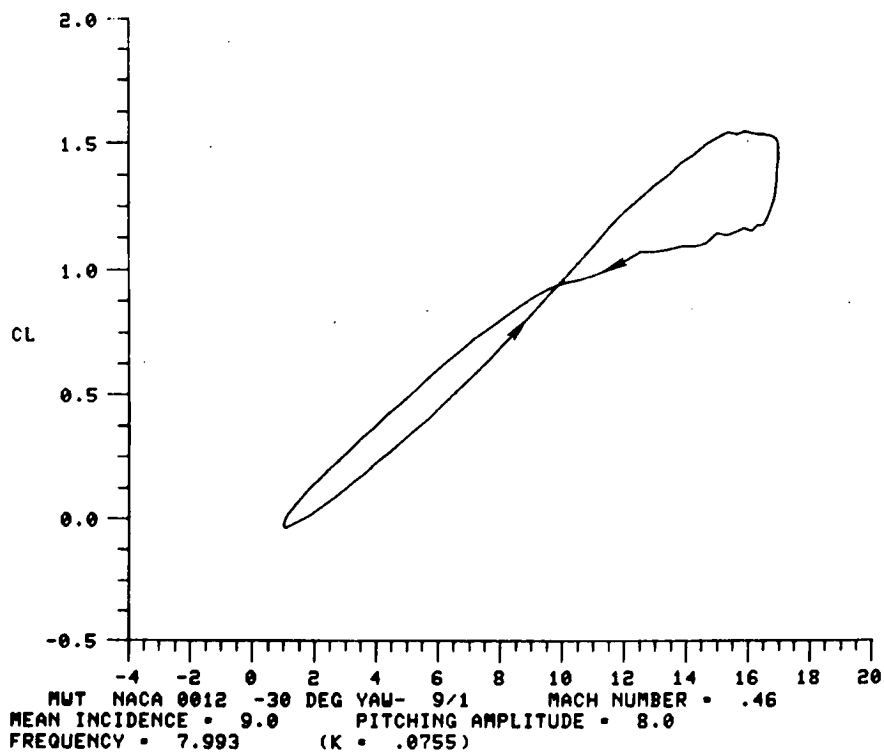
FILE 11. RUN1030.003



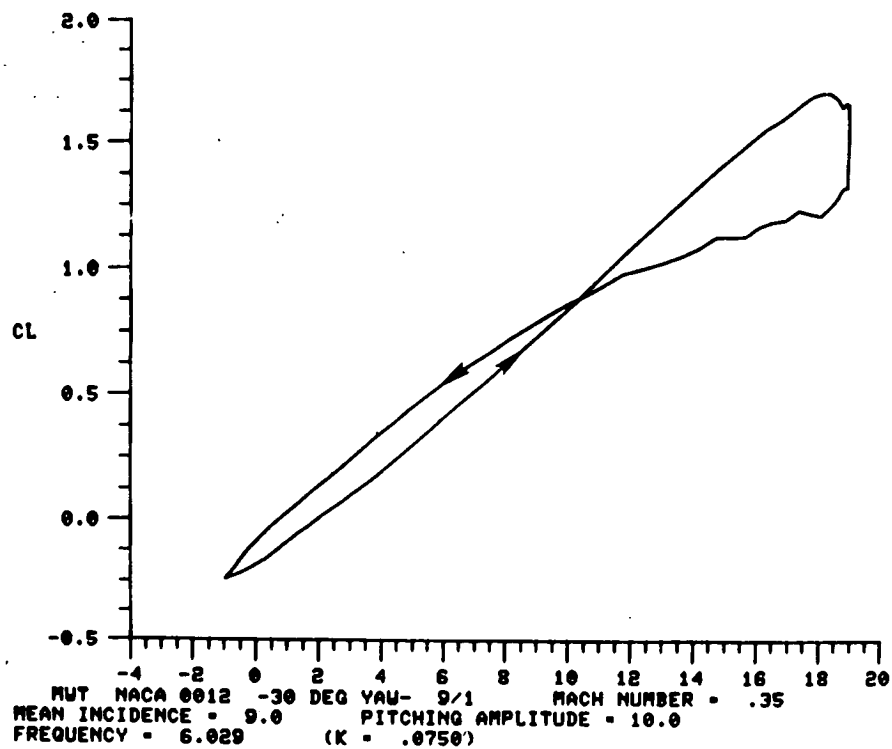
FILE 27. RUN1018.015



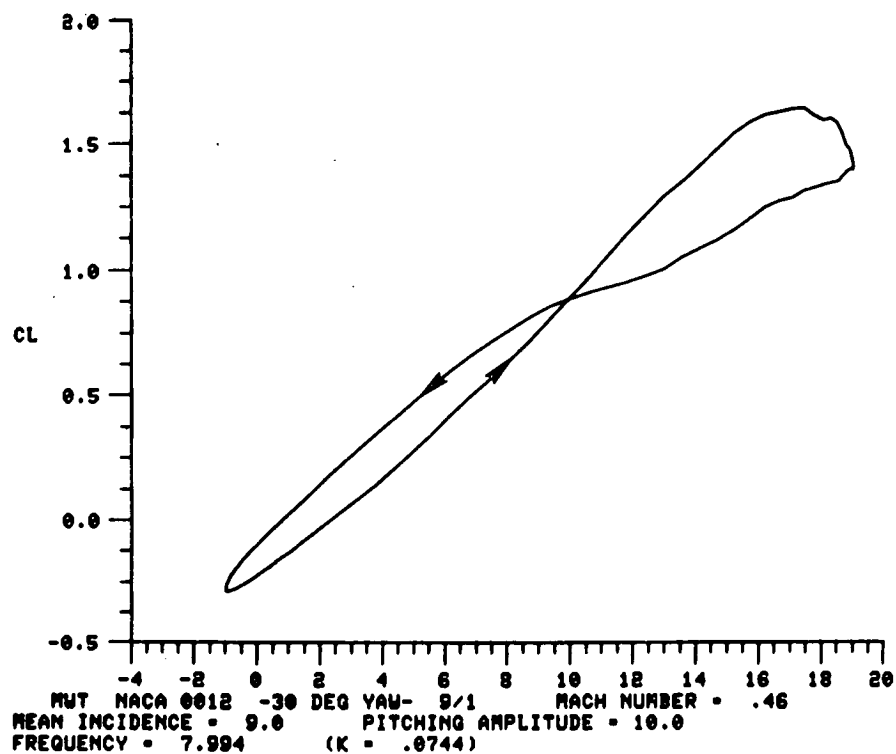
FILE 32. RUN1019.005



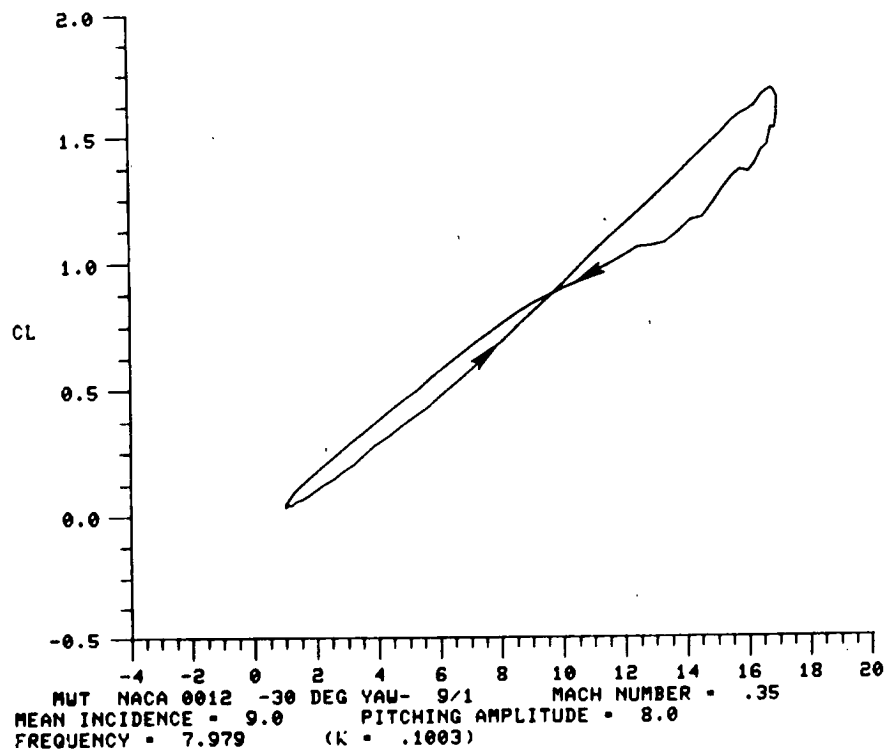
FILE 7. RUN1029.010



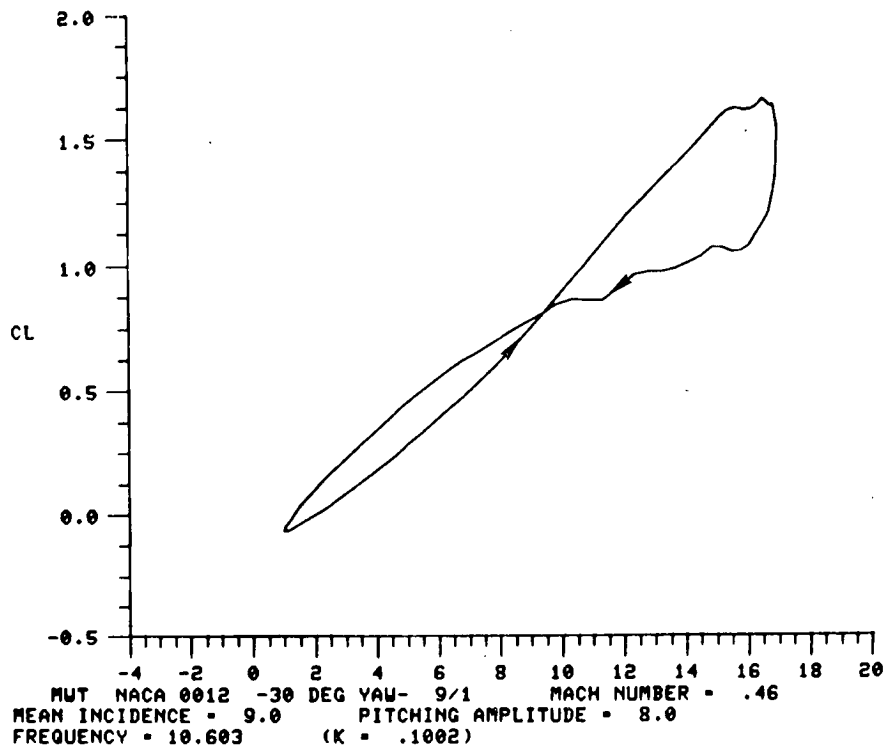
FILE 12. RUN1030.005



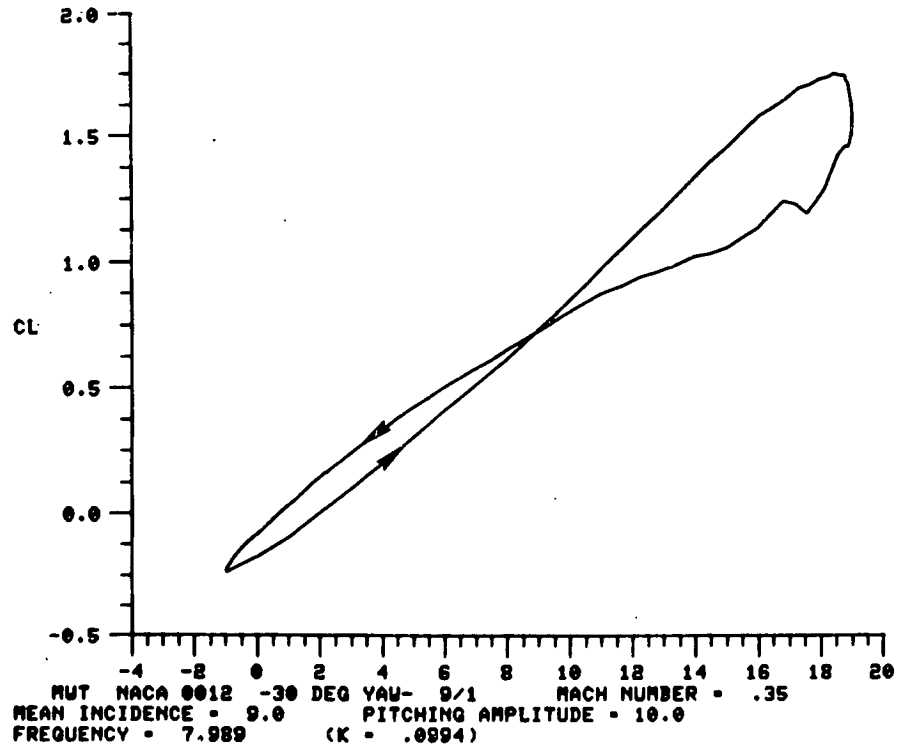
FILE 28. RUN1018.017



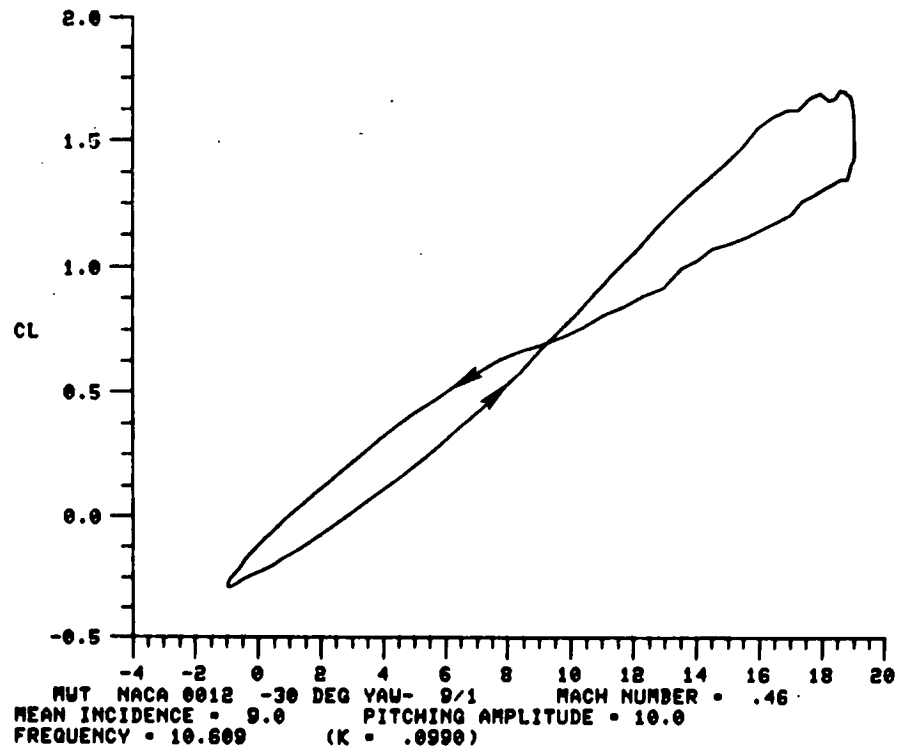
FILE 34. RUN1019.009



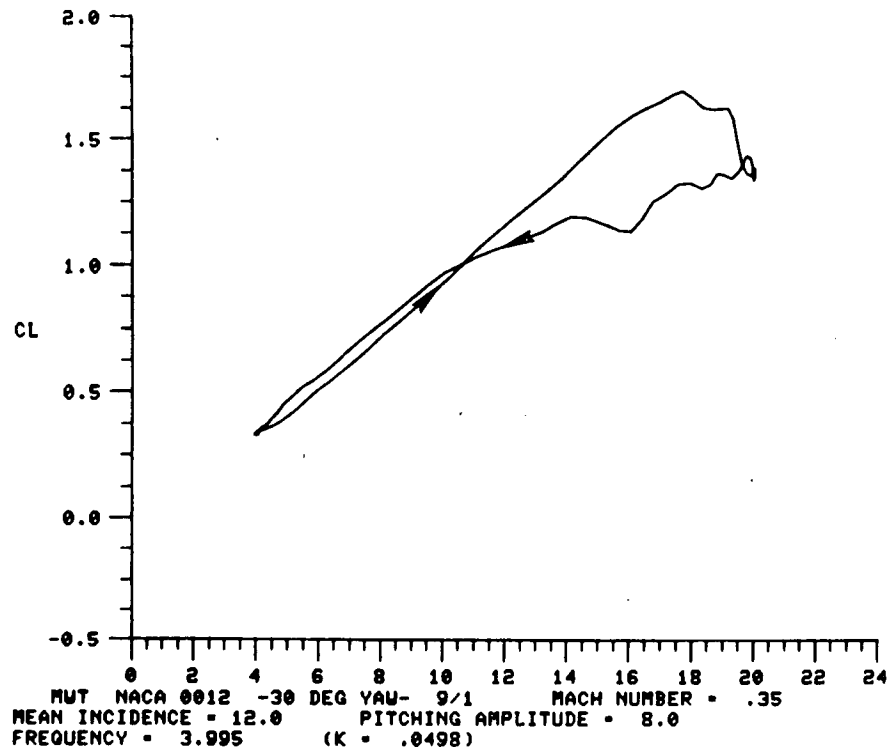
FILE 8. RUN1029.012



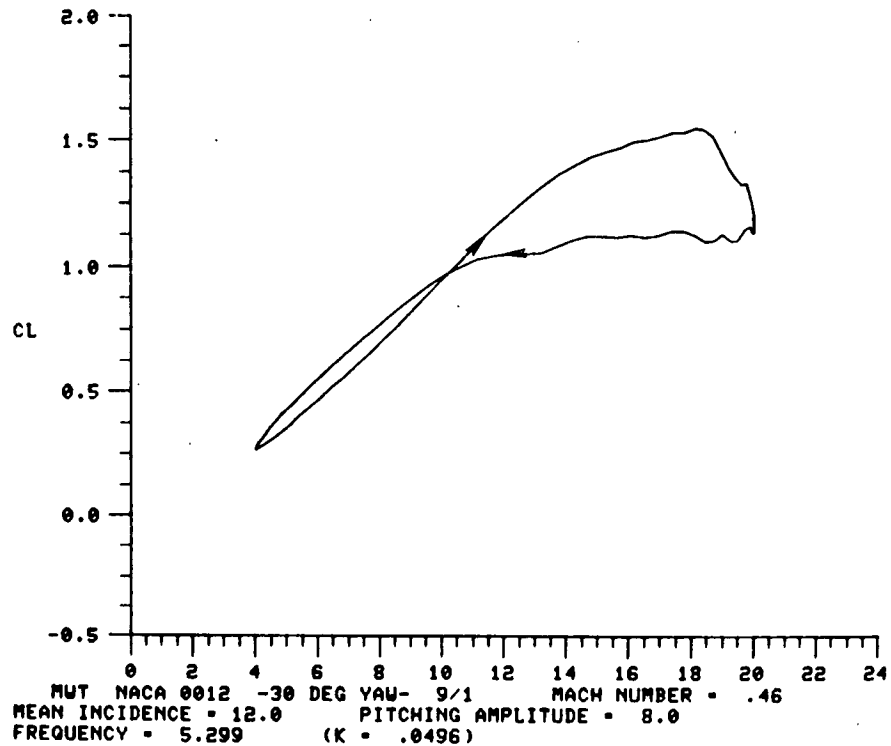
FILE 14. RUN1030.009



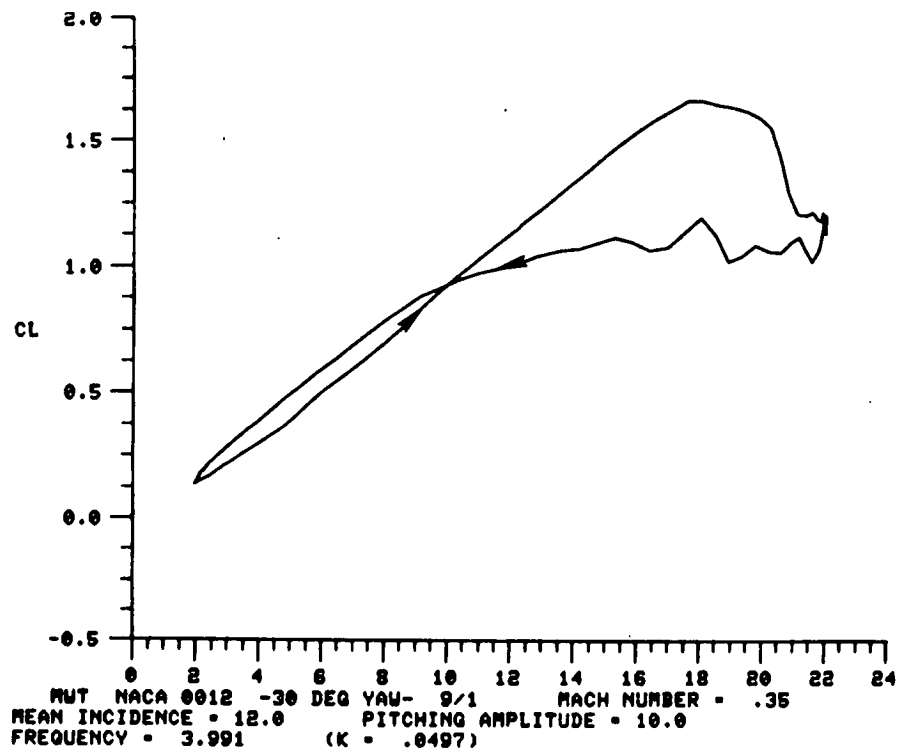
FILE 53. RUN1016.004



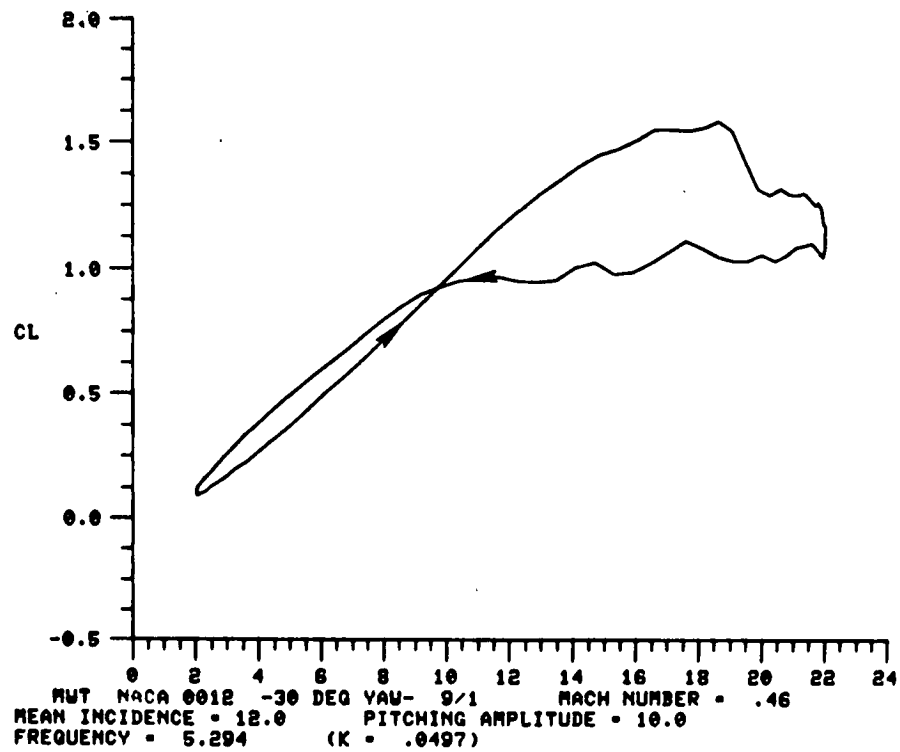
FILE 56. RUN1017.003



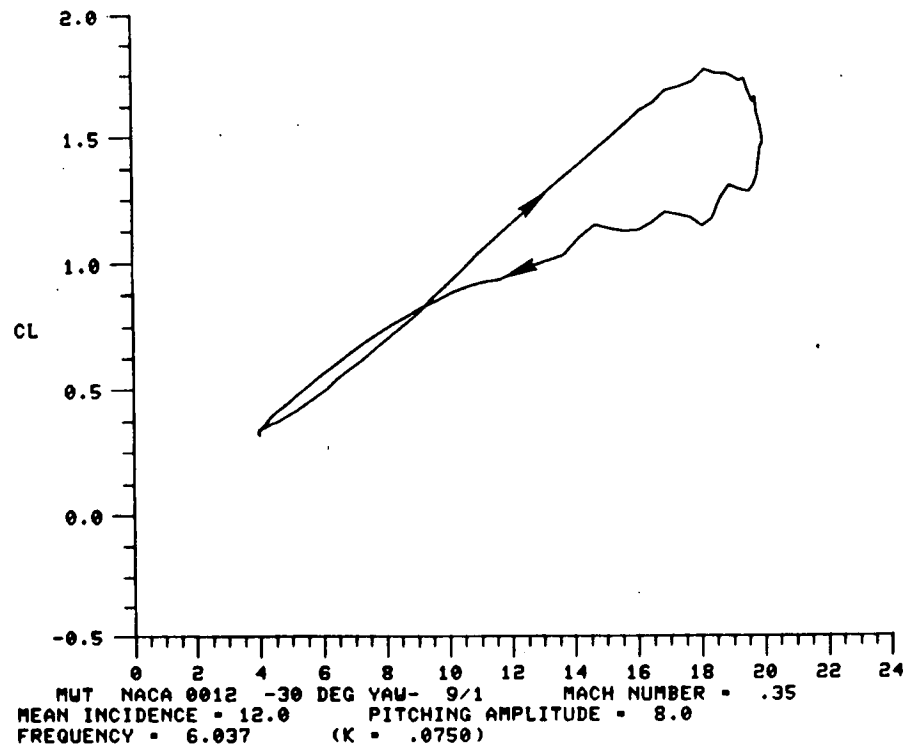
FILE 39. RUN1033.008



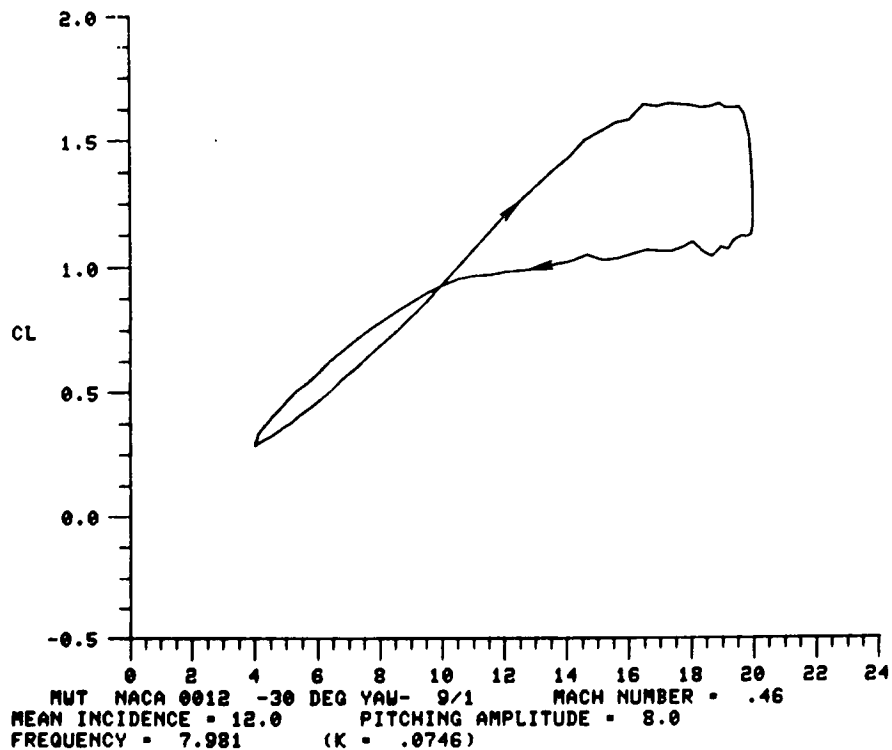
FILE 44. RUN1034.003



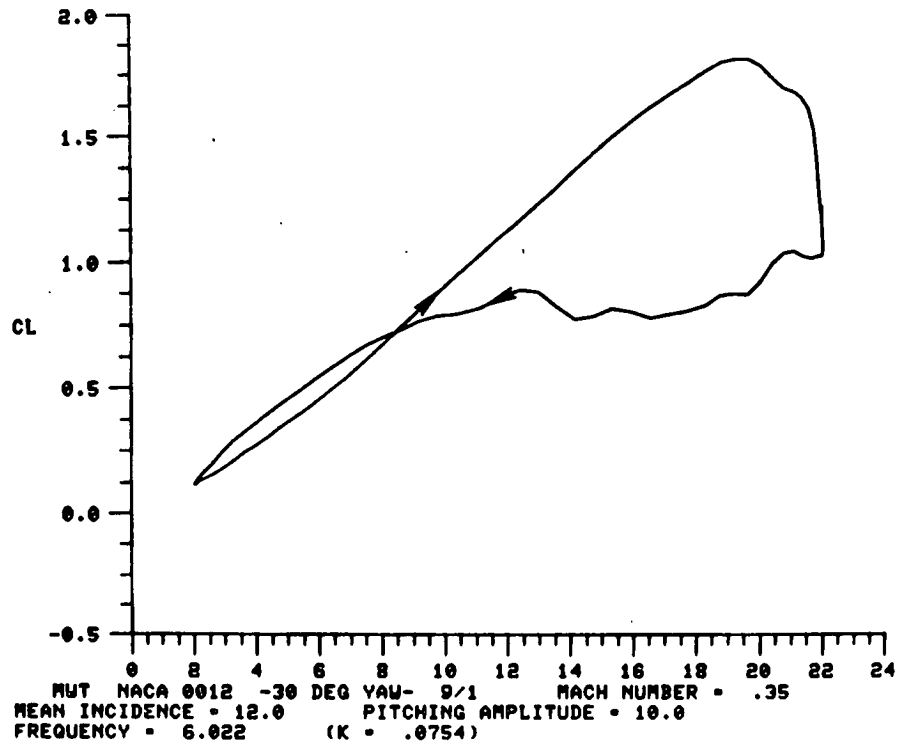
FILE 18. RUN1016.008



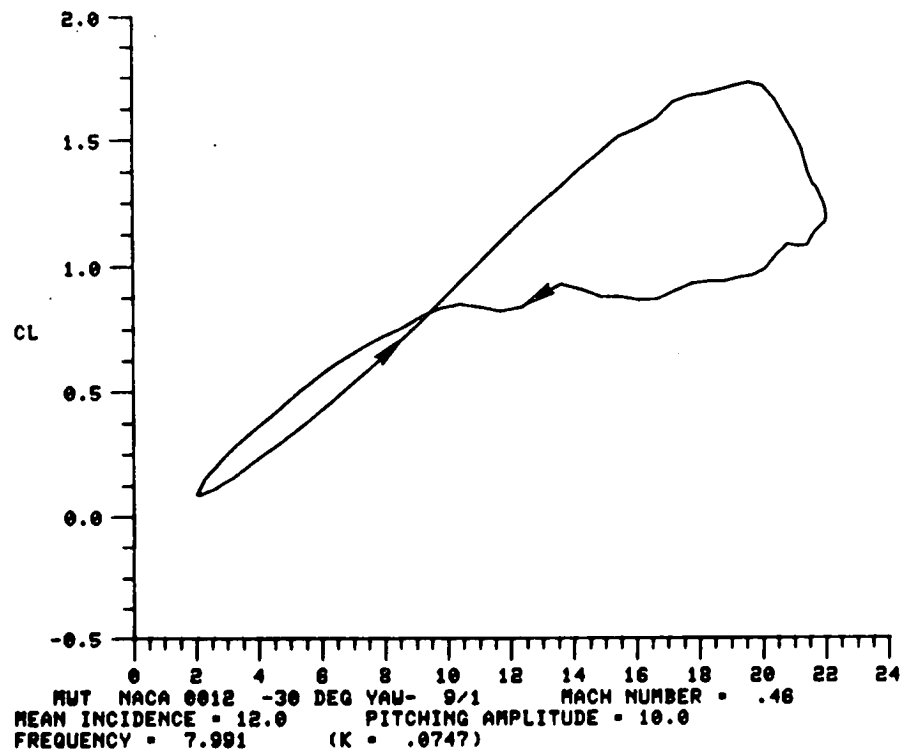
FILE 57. RUN1017.005



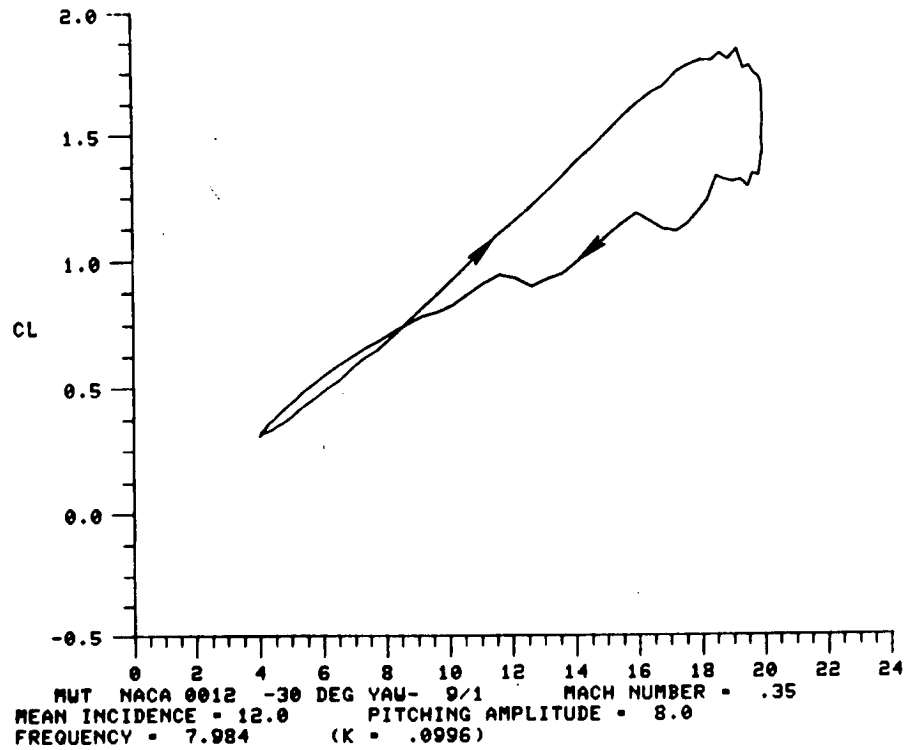
FILE 40. RUN1033.010



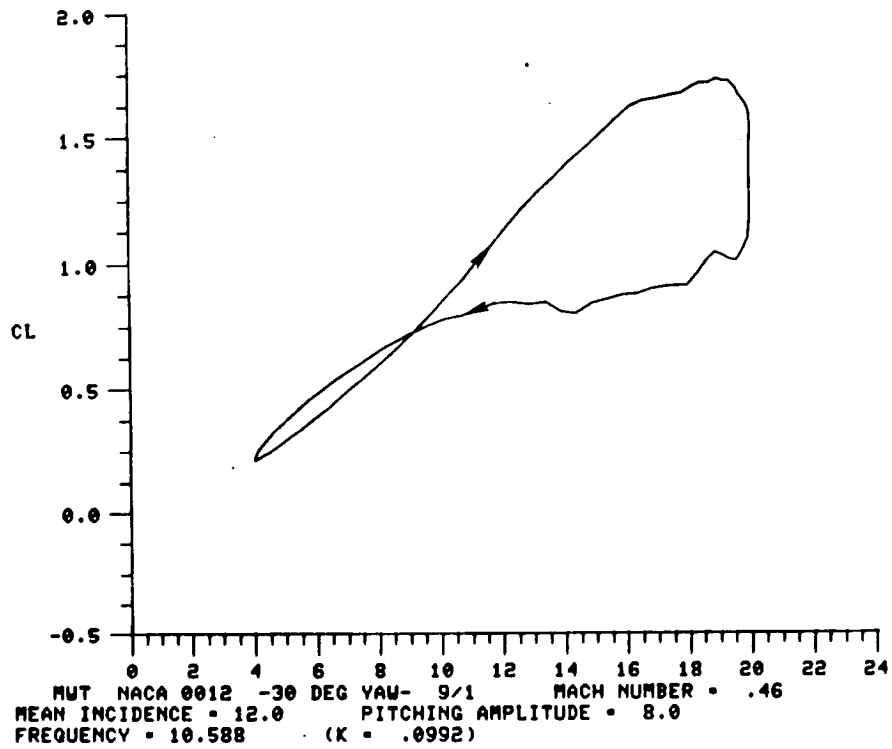
FILE 45. RUN1034.005



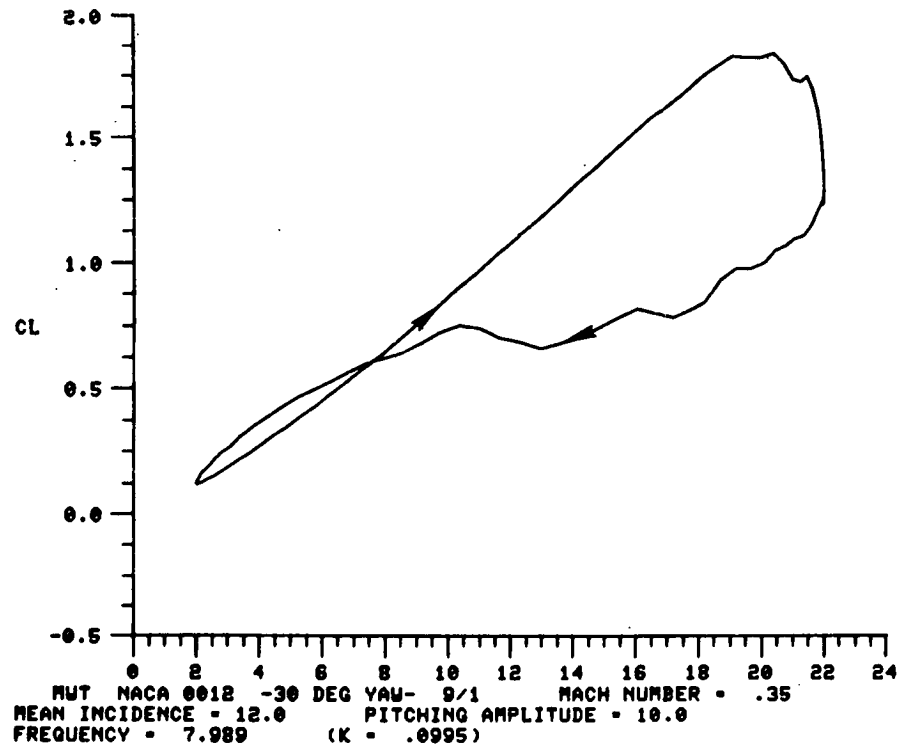
FILE 19. RUN1016.010



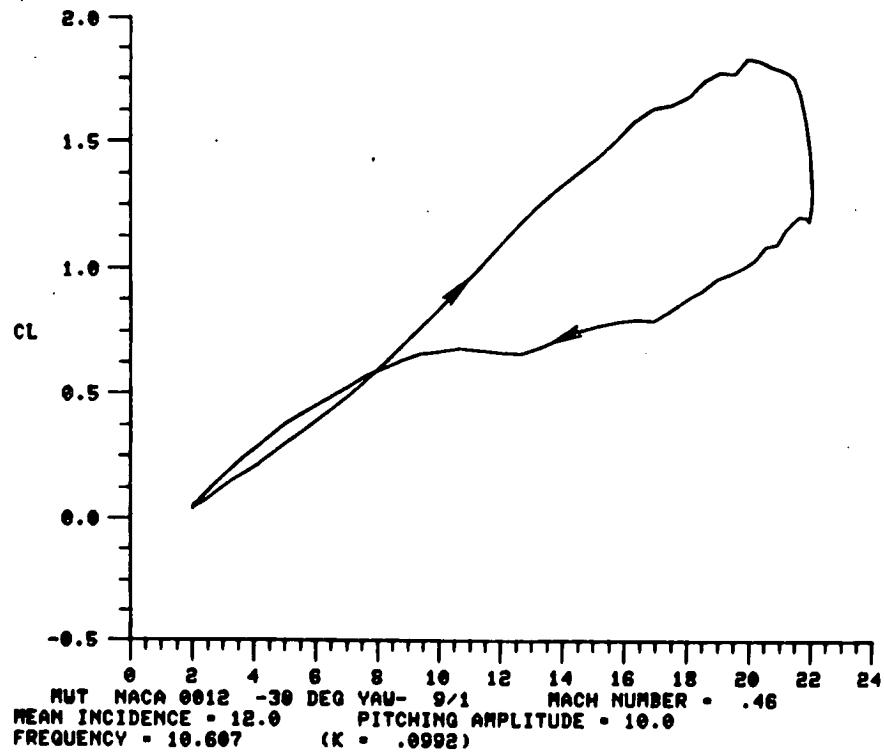
FILE 58. RUN1017.009



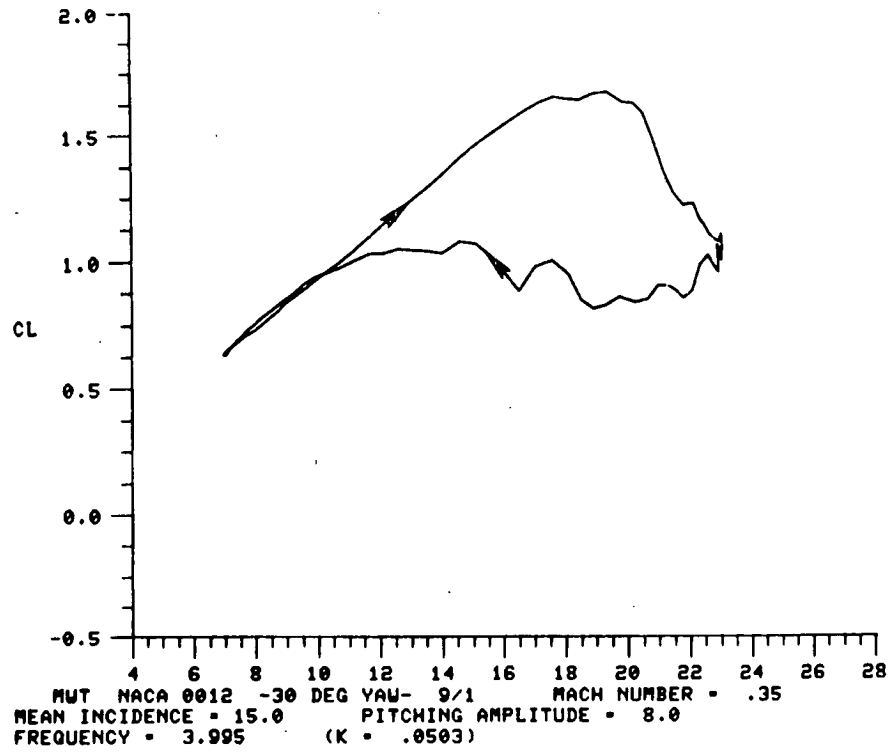
FILE 41. RUN1033.012



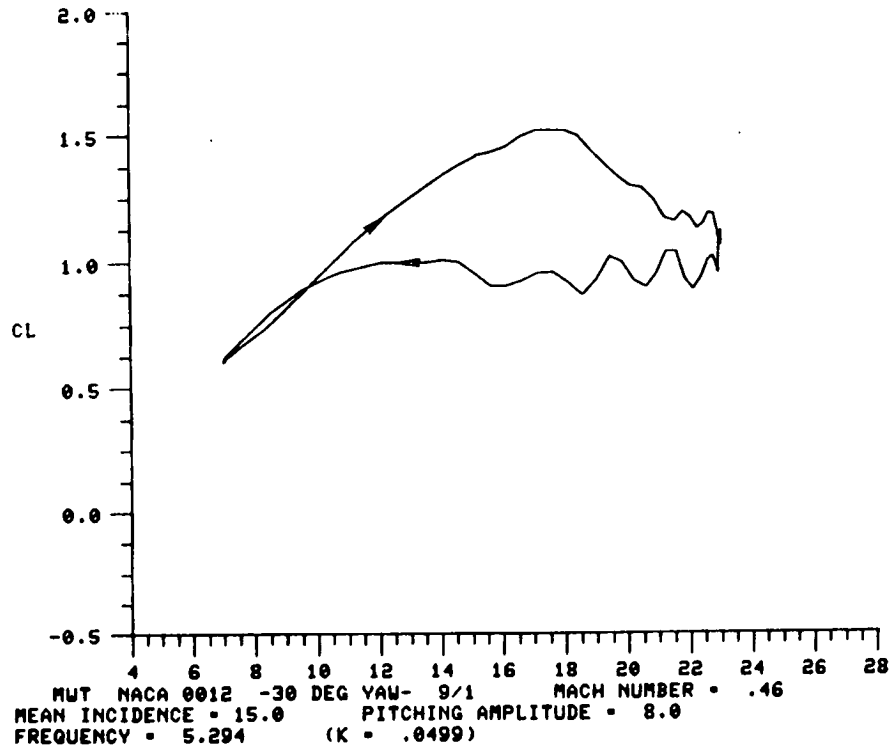
FILE 47. RUN1034.009



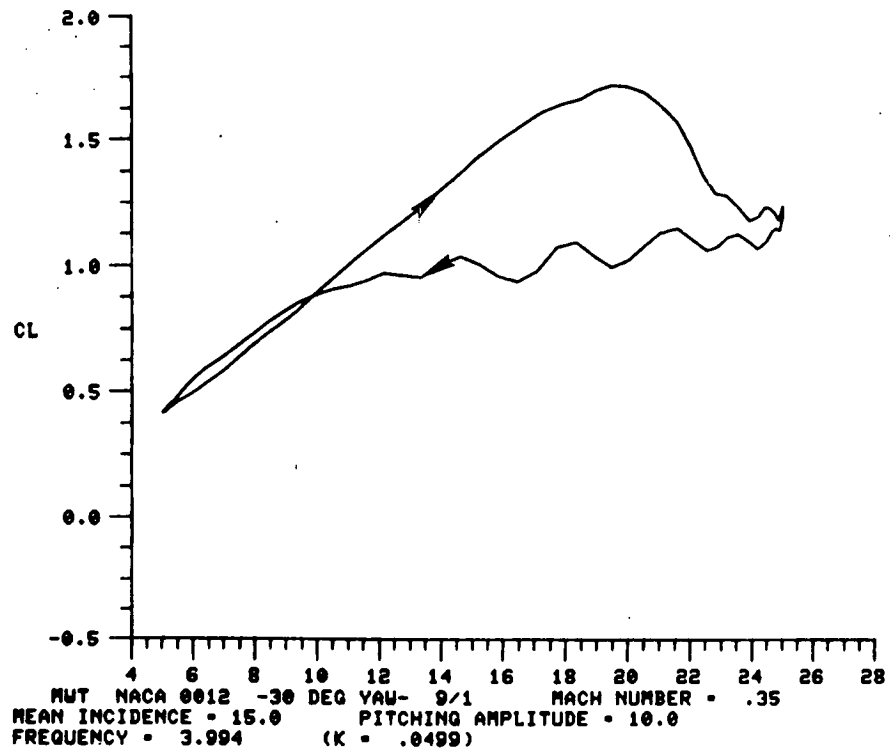
FILE 35. RUN1020.008



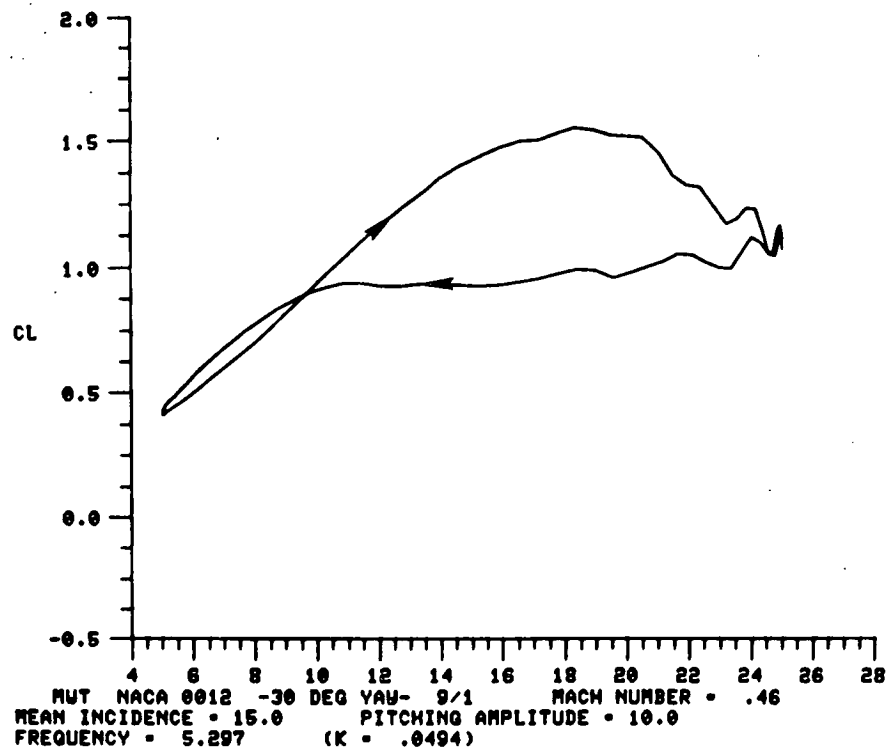
FILE 40. RUN1021.003



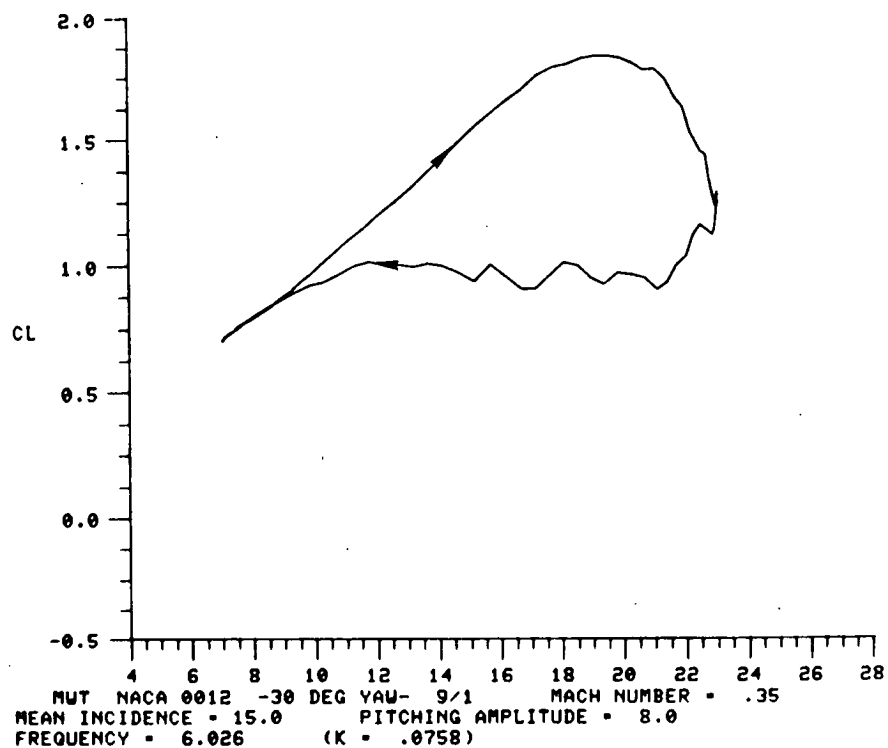
FILE 53. RUN1036.001



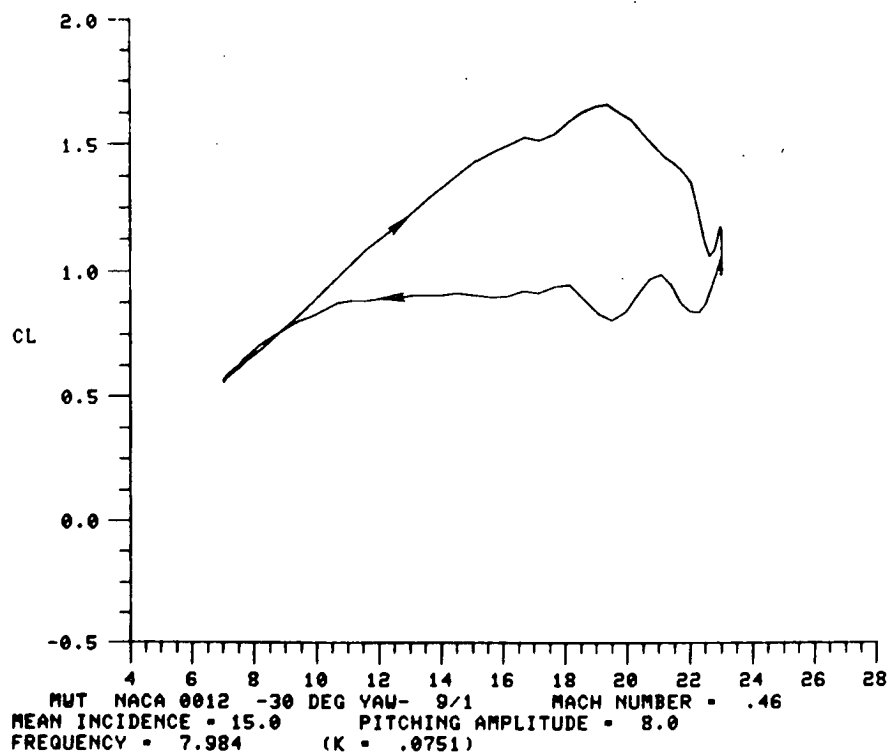
FILE 58. RUN1037.003



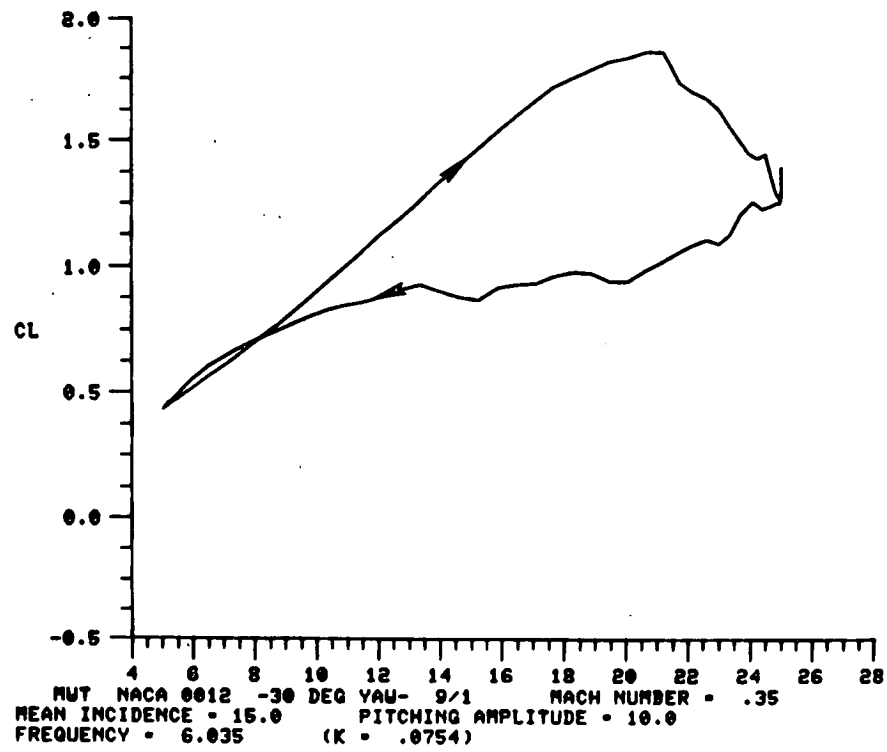
FILE 36. RUN1020.010



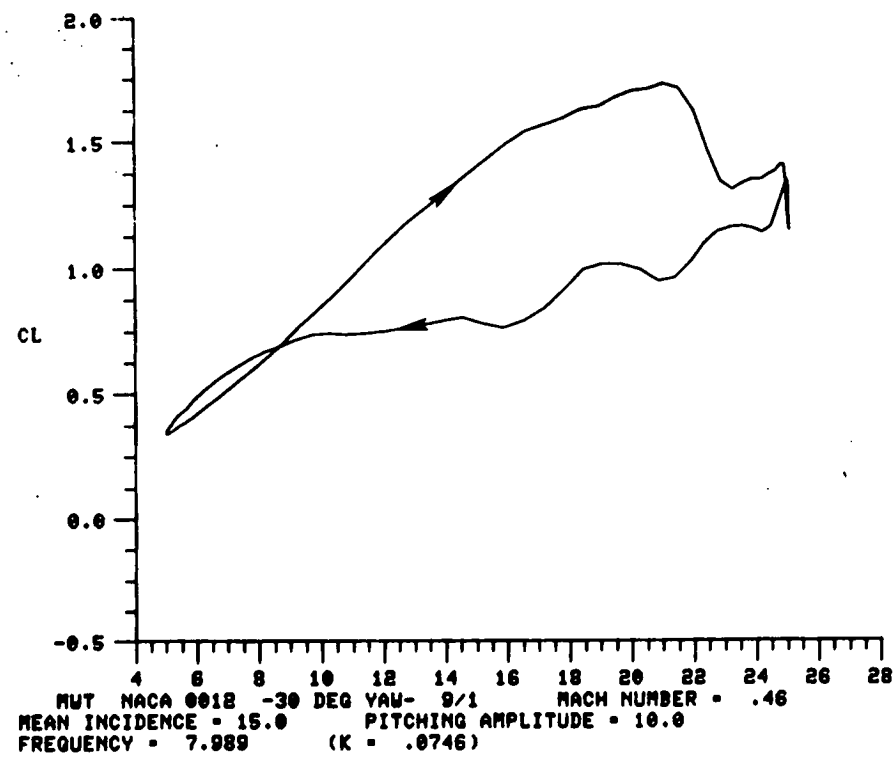
FILE 63. RUN1021.005



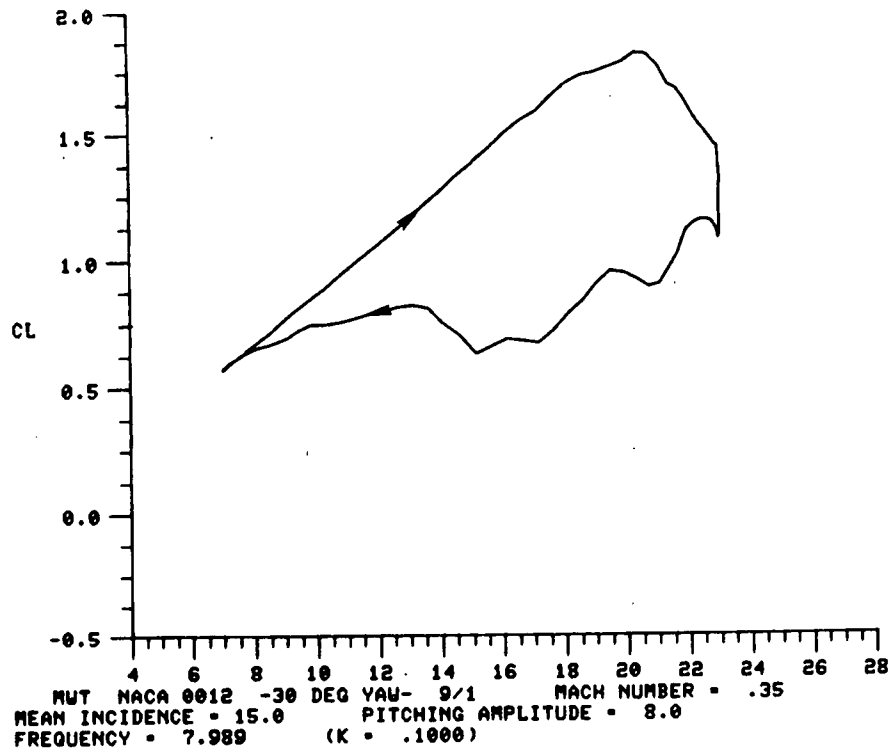
FILE 54. RUN1036.003



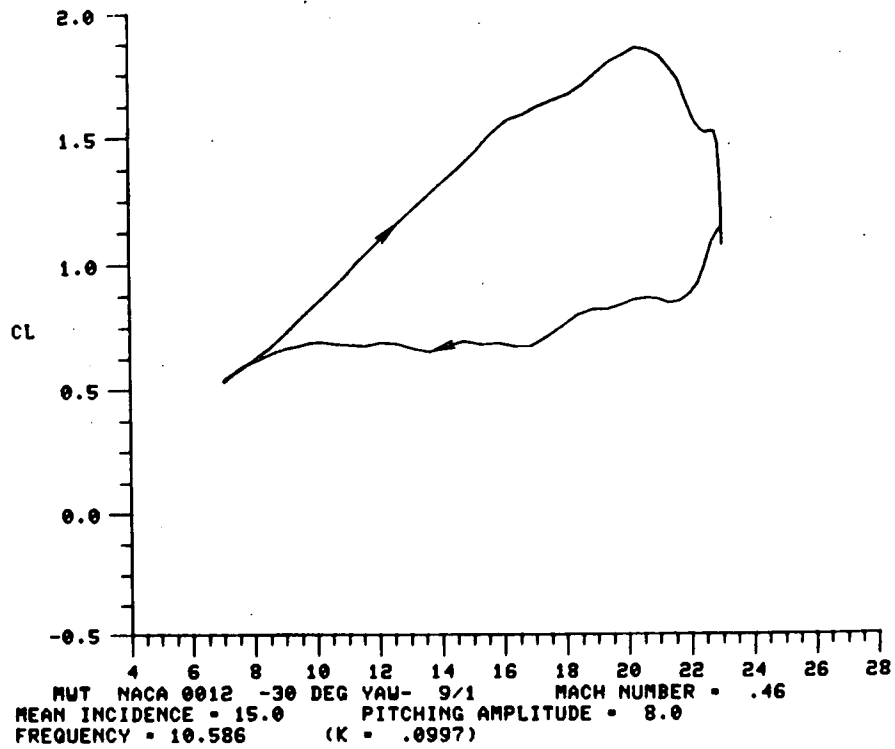
FILE 59. RUN1037.005



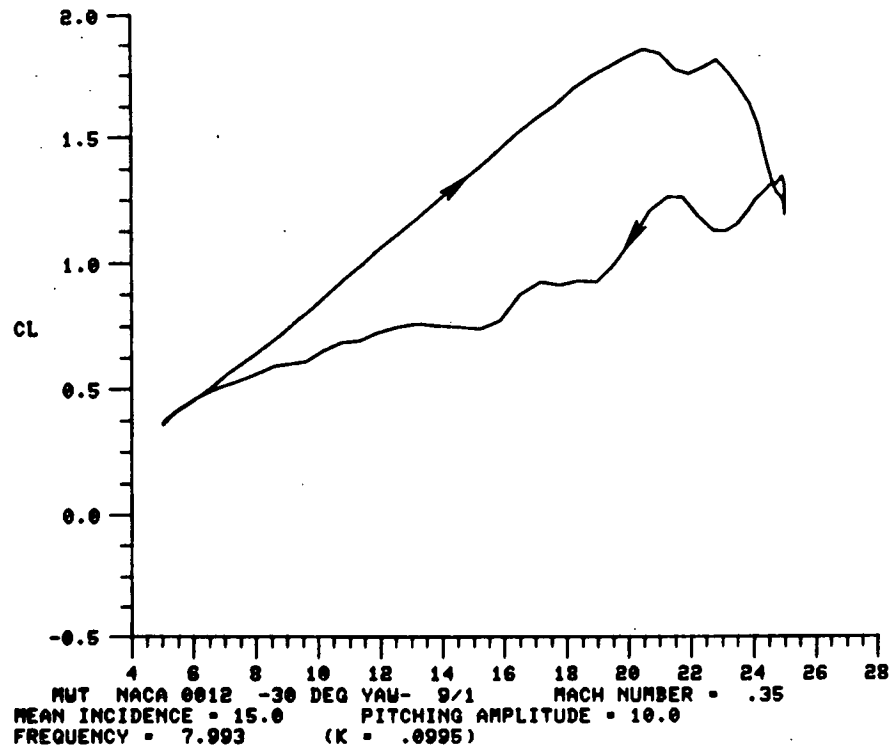
FILE 37. RUN1020.012



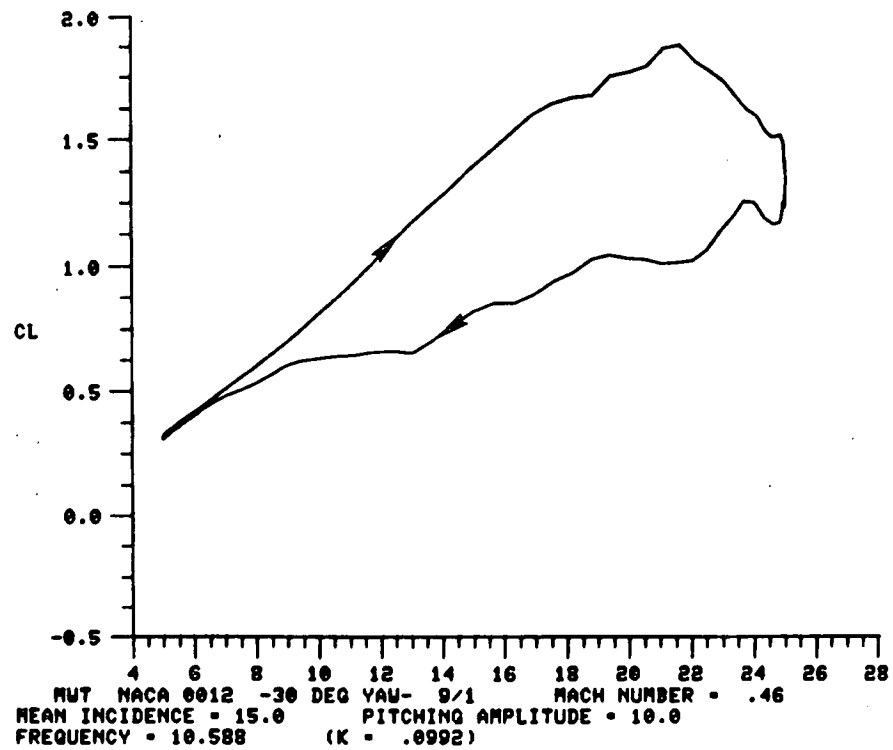
FILE 65. RUN1021.010



FILE 55. RUN1036.005



FILE 61. RUN1037.009

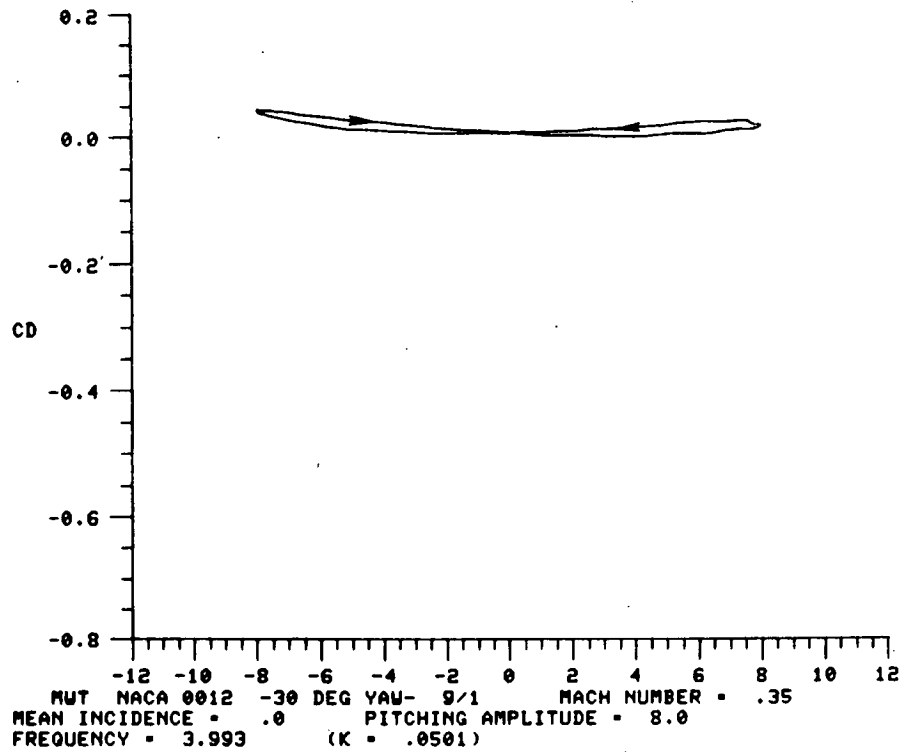


EFFECT OF MACH NUMBER ON THE SWEPT WING PRESSURE DRAG RESPONSE *

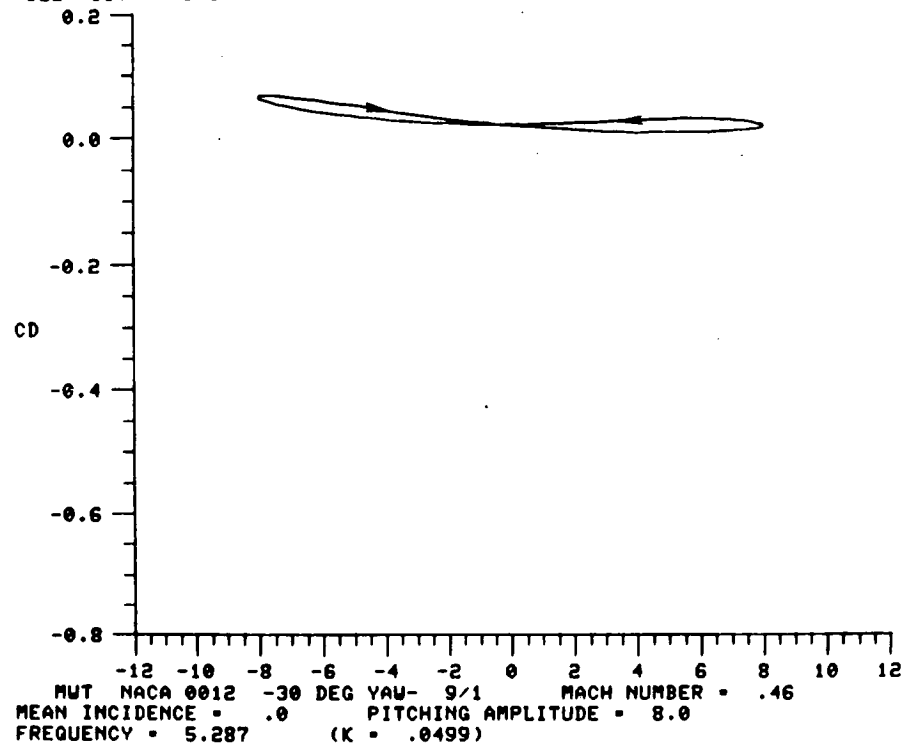
<u>Mean Incidence Angle</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0	.050	336,337
↓	.075	338,339
↓	.100	340,341
9	.050	342,343
↓	.075	344,345
↓	.100	346,347
12	.050	348,349
↓	.075	350,351
↓	.100	352,353
15	.050	354,355
↓	.075	356,357
↓	.100	358,359

* The effect of Mach number is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

FILE 8. RUN1007.005



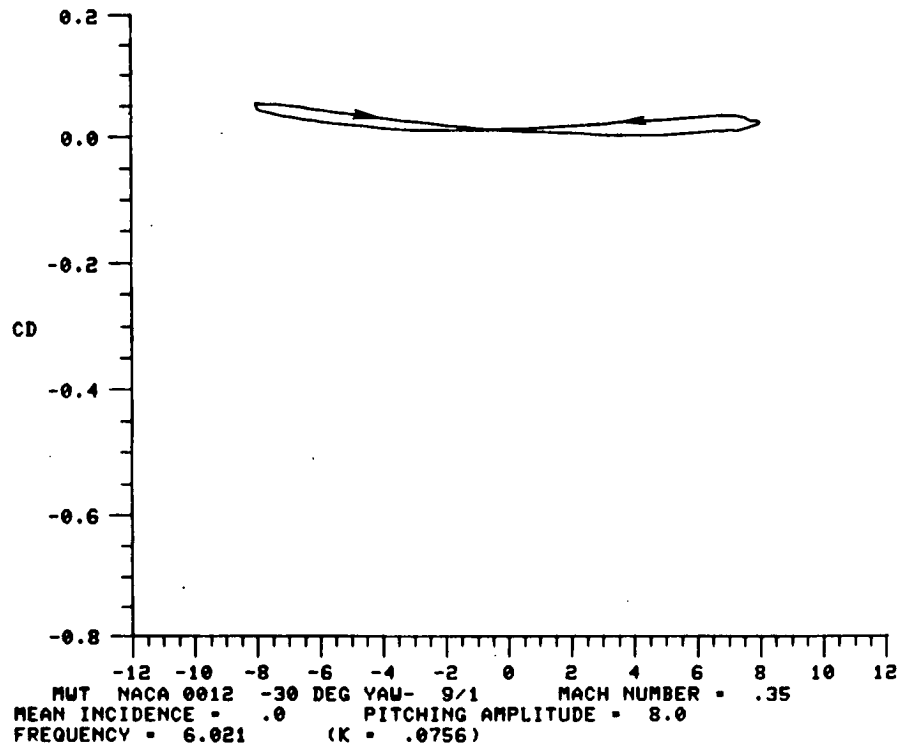
FILE 13. RUN1008.003



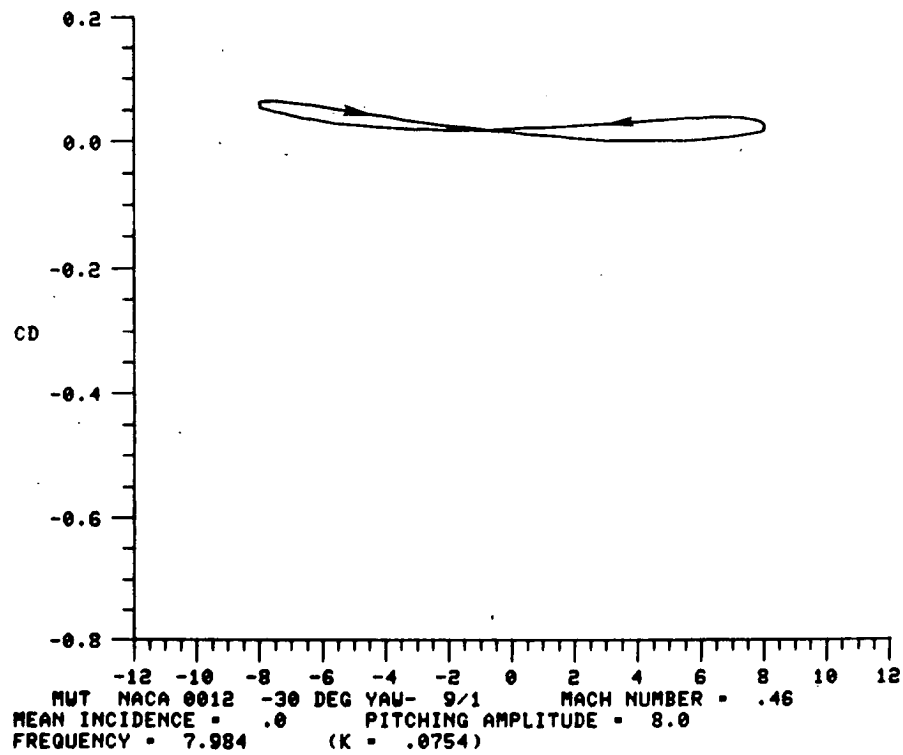
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 9. RUN1007.007



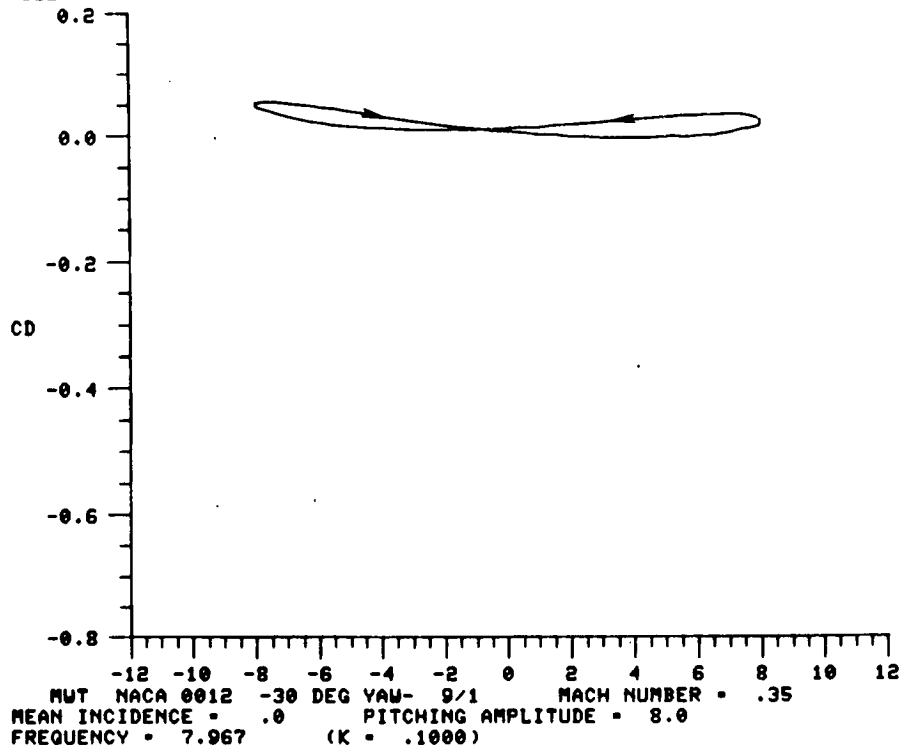
FILE 14: RUN1008.005



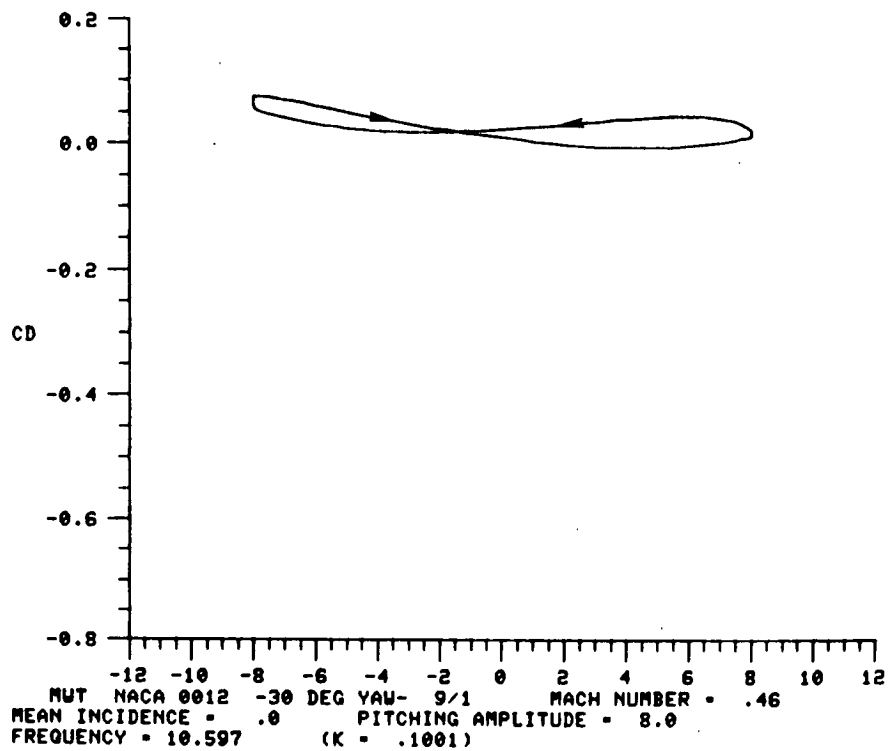
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 10. RUN1007.009



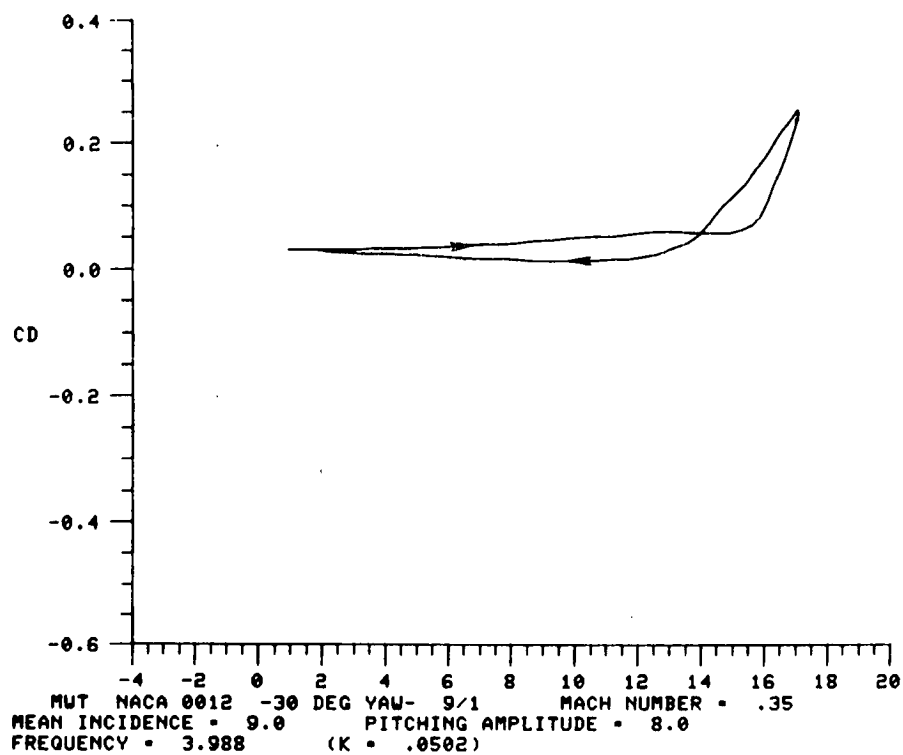
FILE 49. RUN1008.009



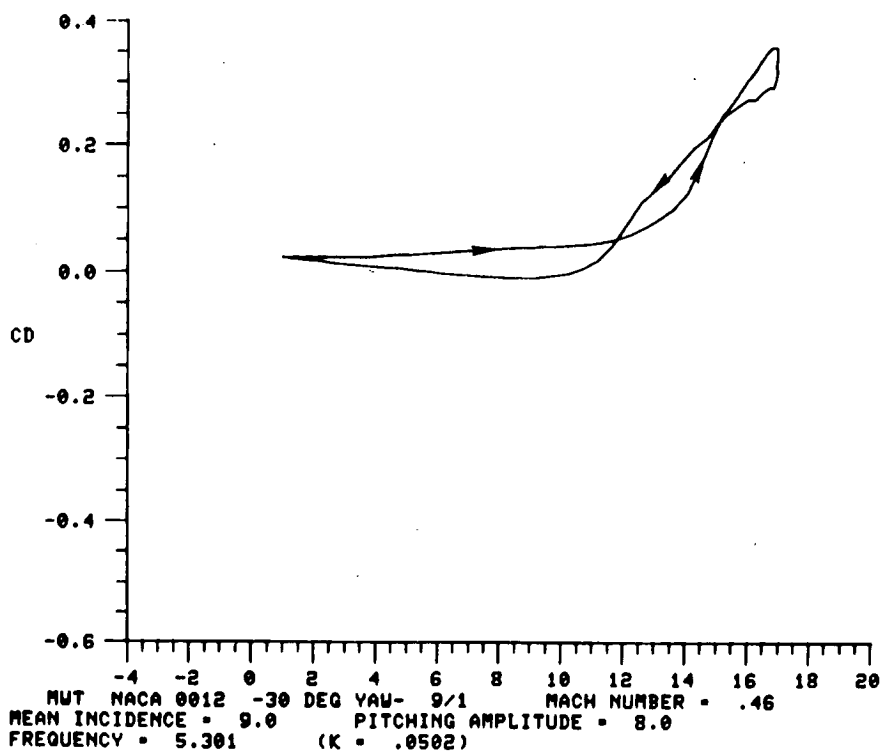
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

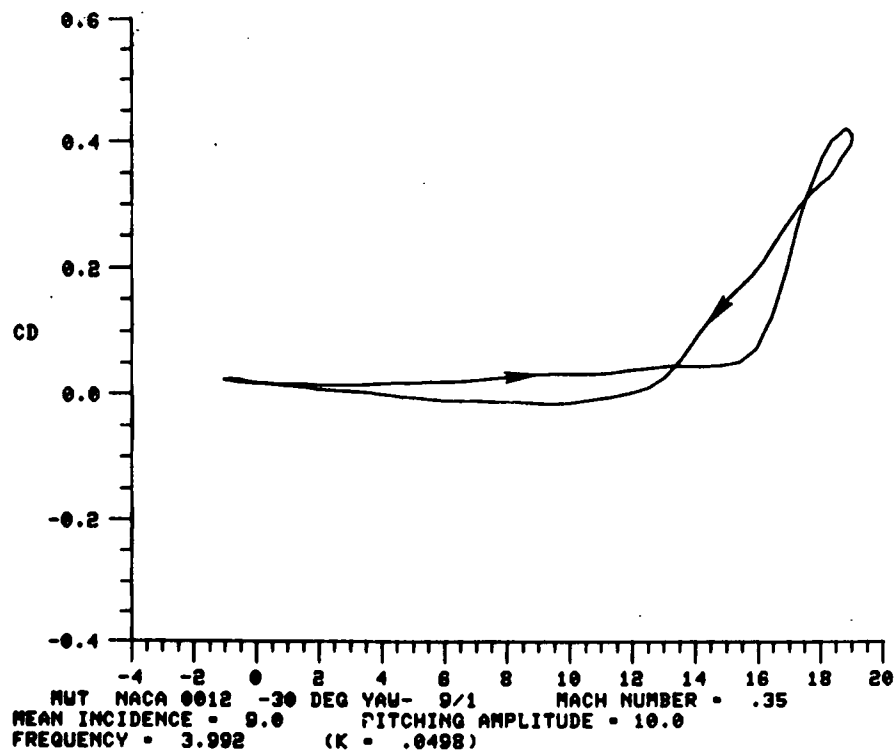
FILE 26. RUN1018.013



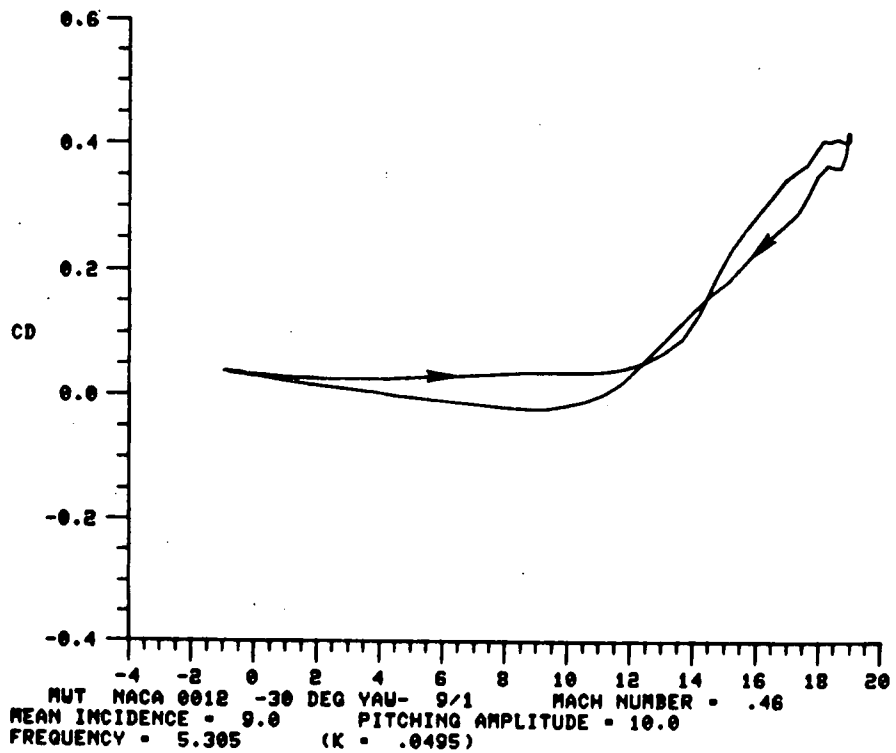
FILE 31. RUN1019.003



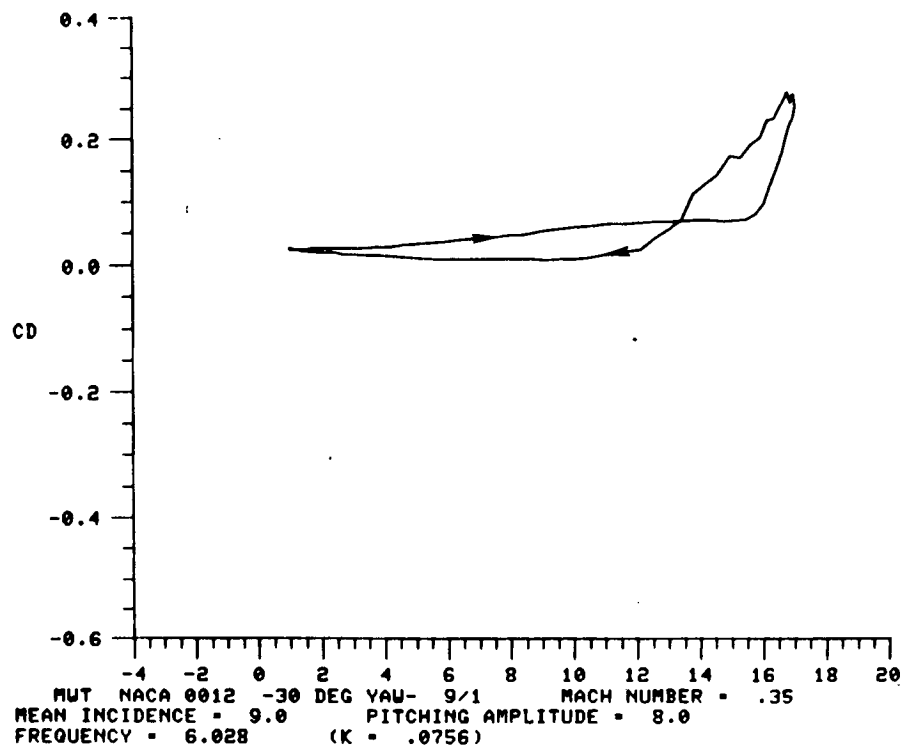
FILE 6. RUN1029.008



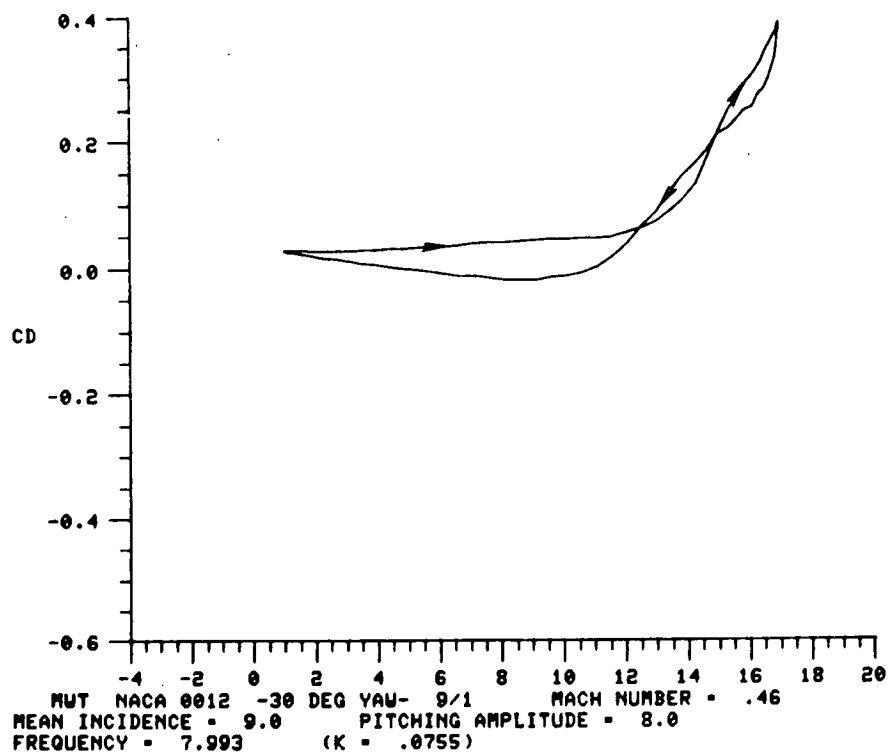
FILE 11. RUN1030.003



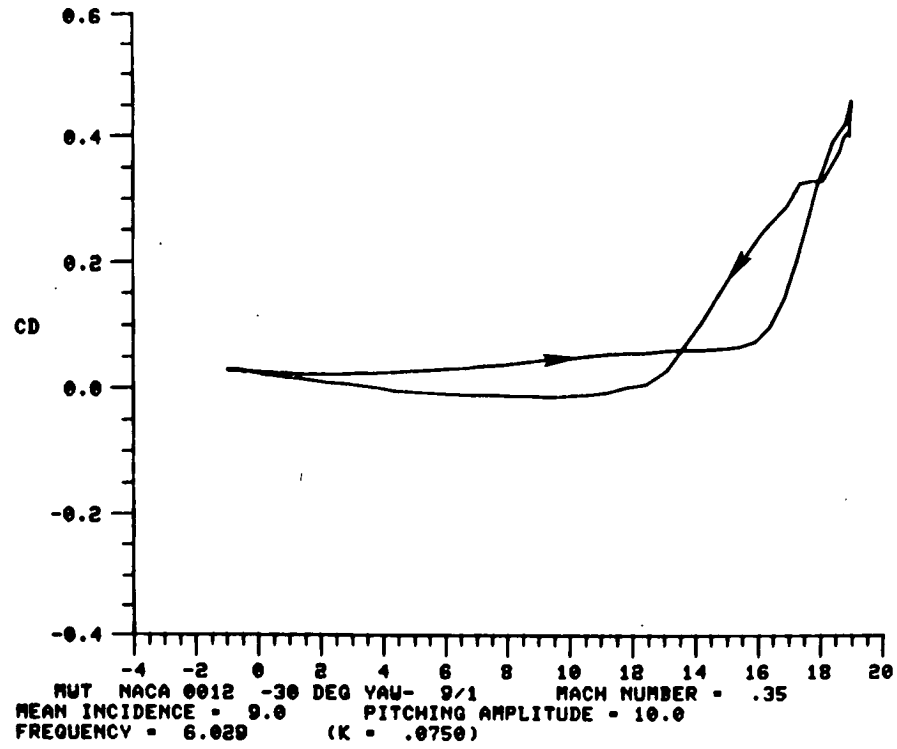
FILE 27. RUN1018.015



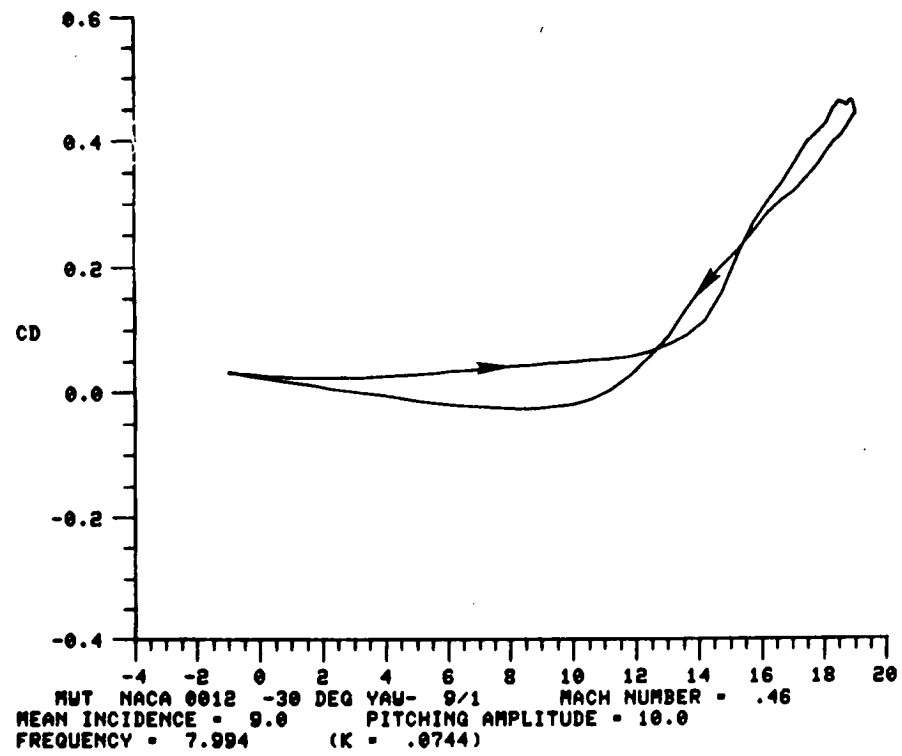
FILE 32. RUN1019.005



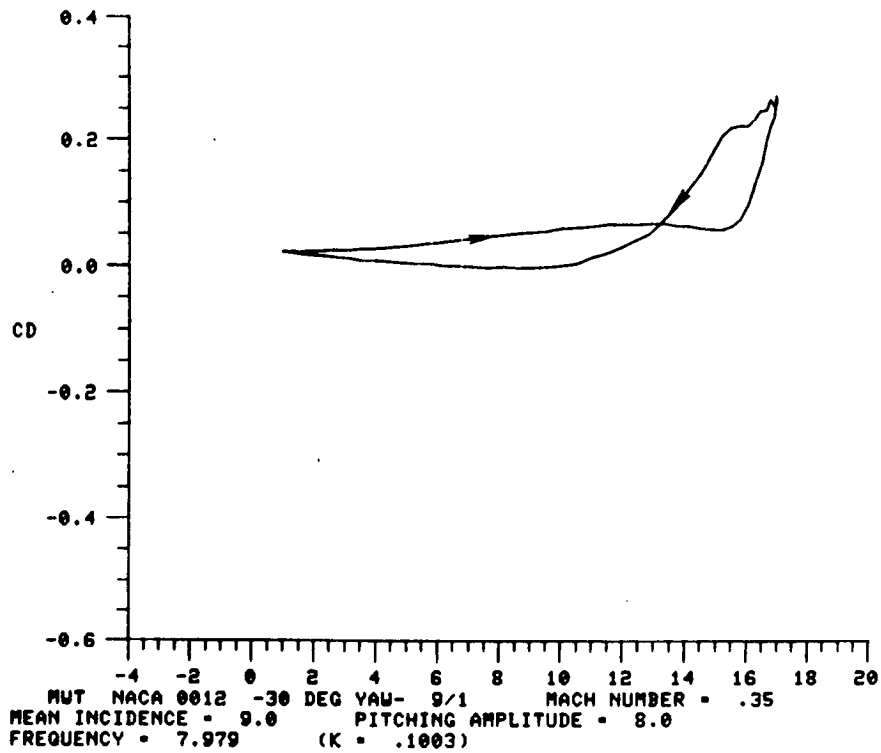
FILE 7. RUN1029.010



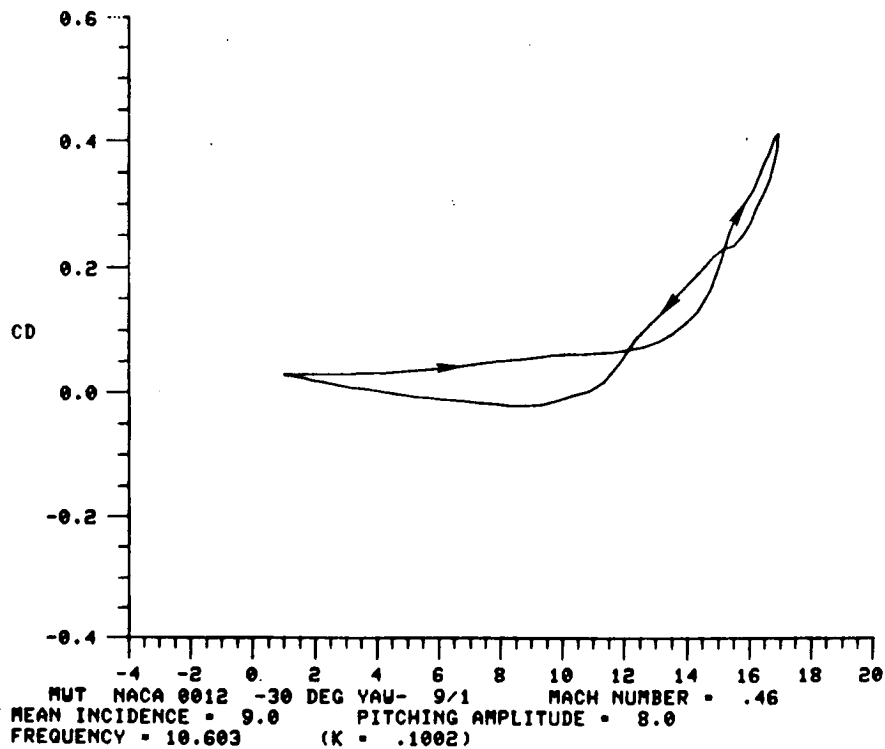
FILE 12. RUN1030.005



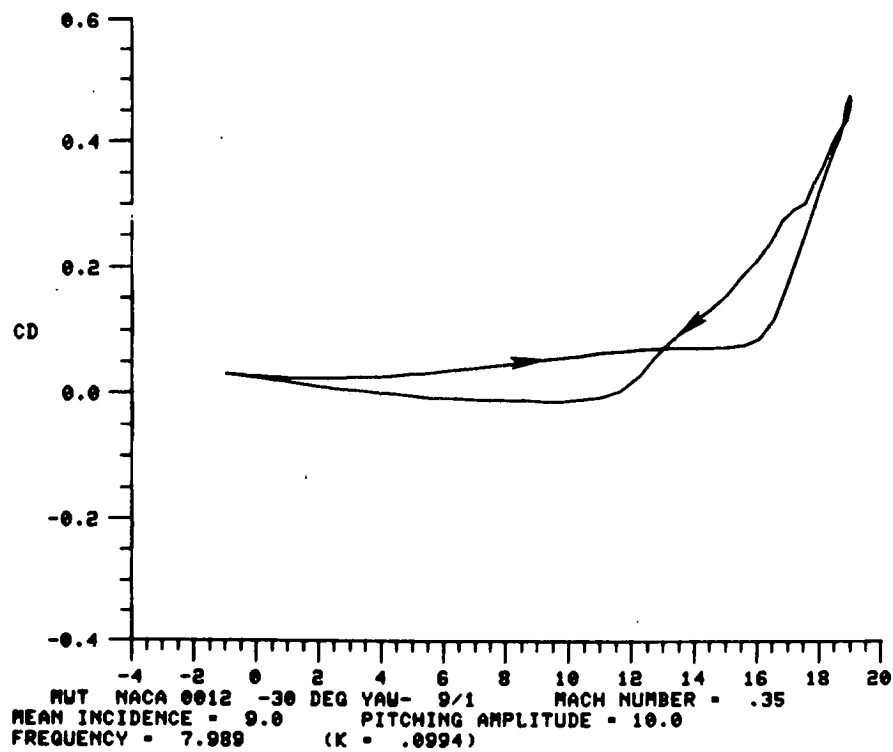
FILE 28. RUN1018.017



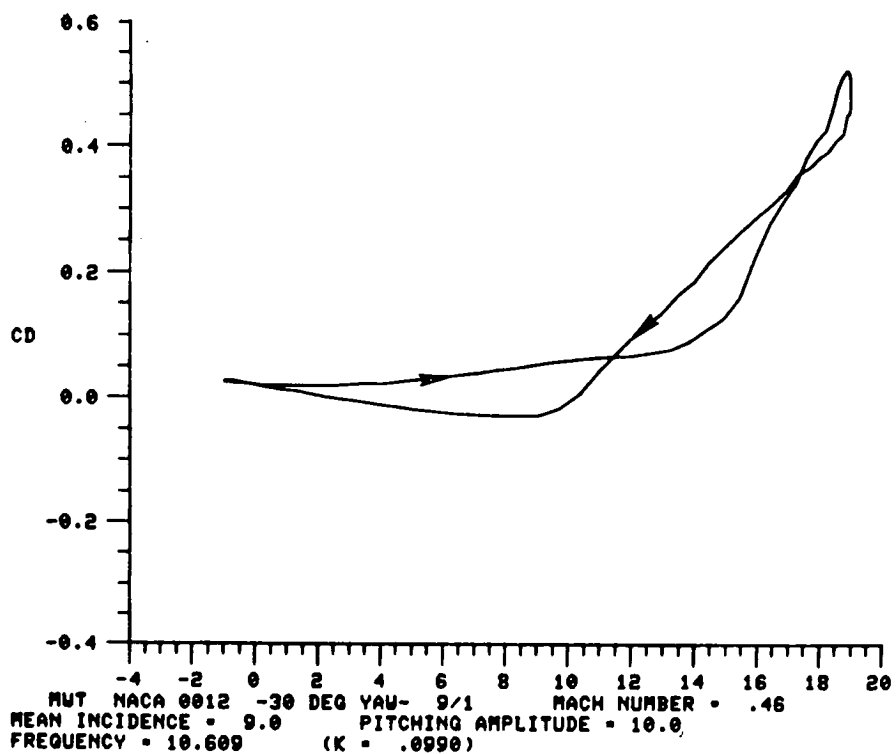
FILE 34. RUN1019.009



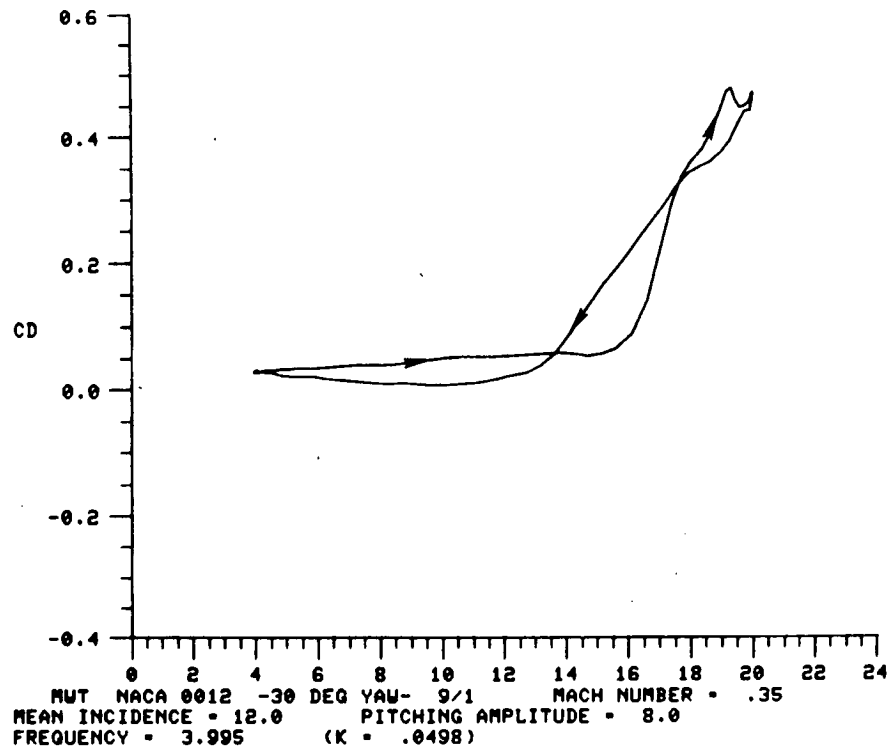
FILE 8. RUN1029.012



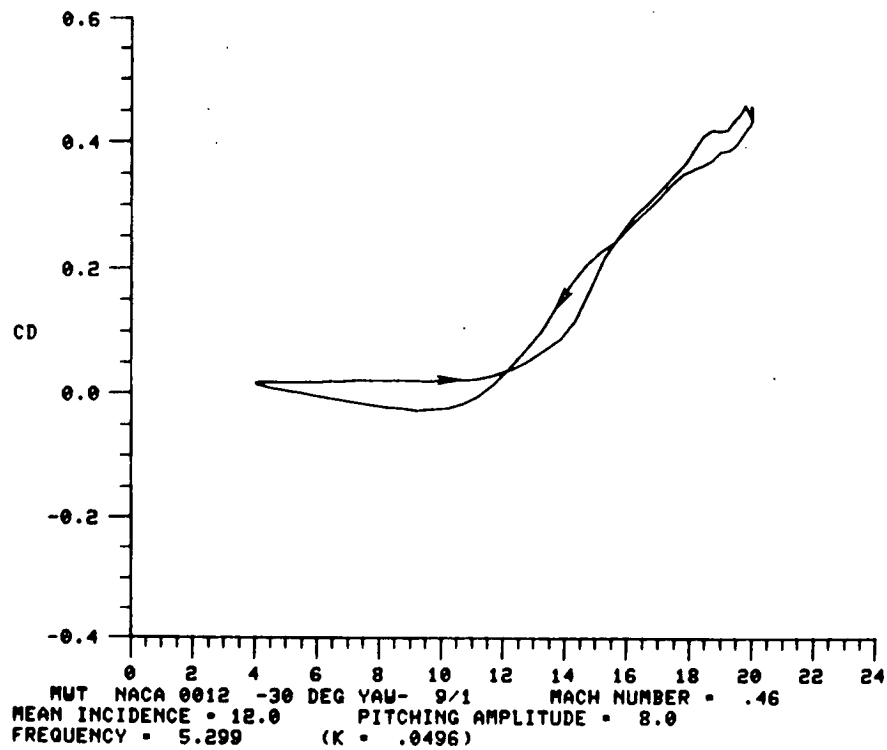
FILE 14. RUN1030.099



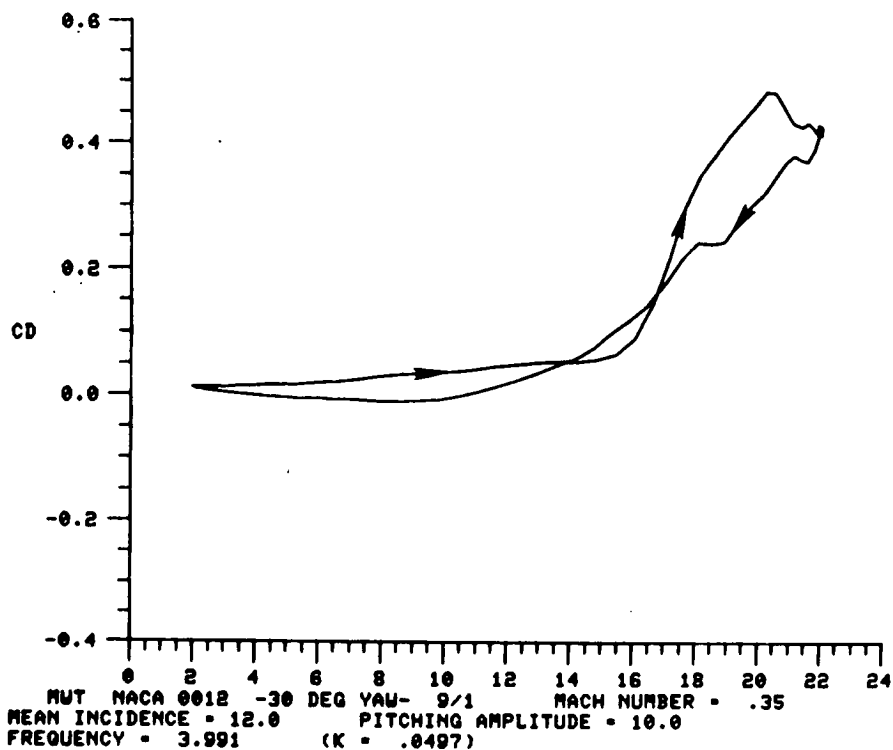
FILE 53. RUN1016.004



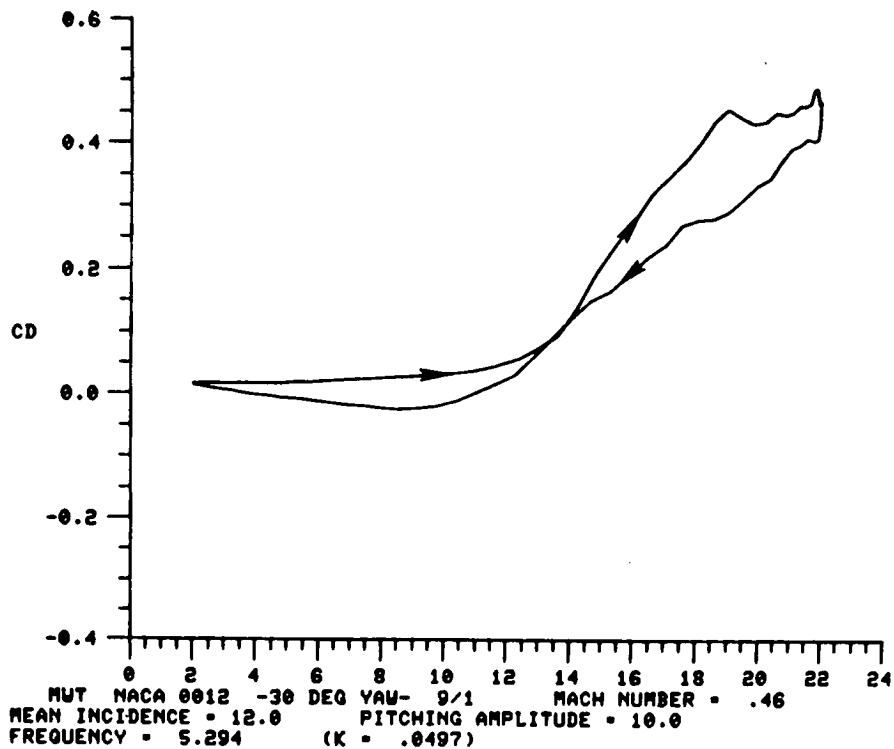
FILE 56. RUN1017.003



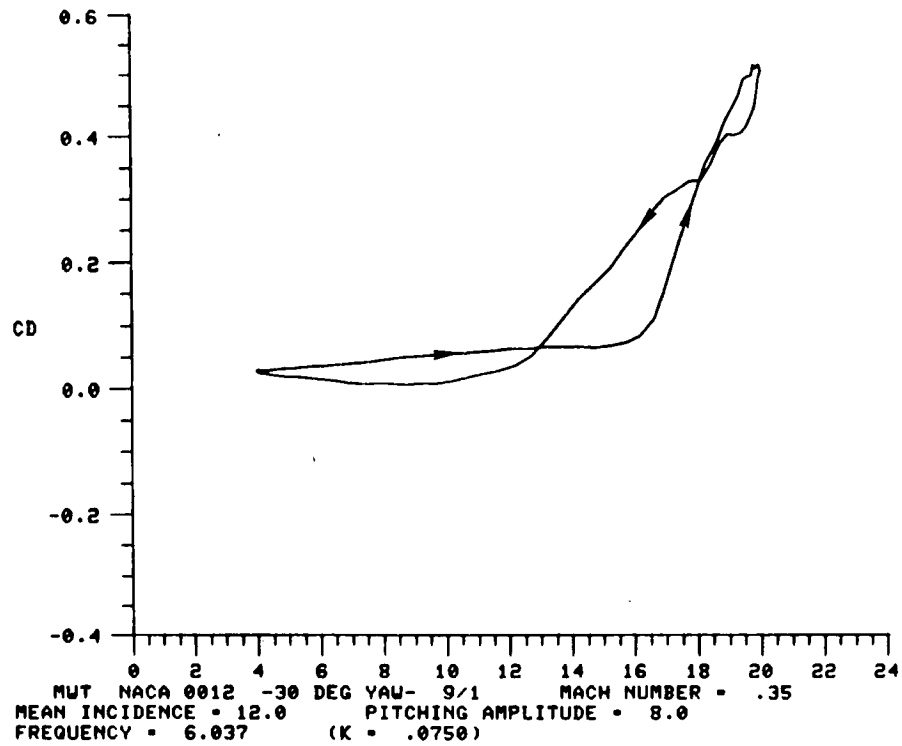
FILE 39. RUN1033.008



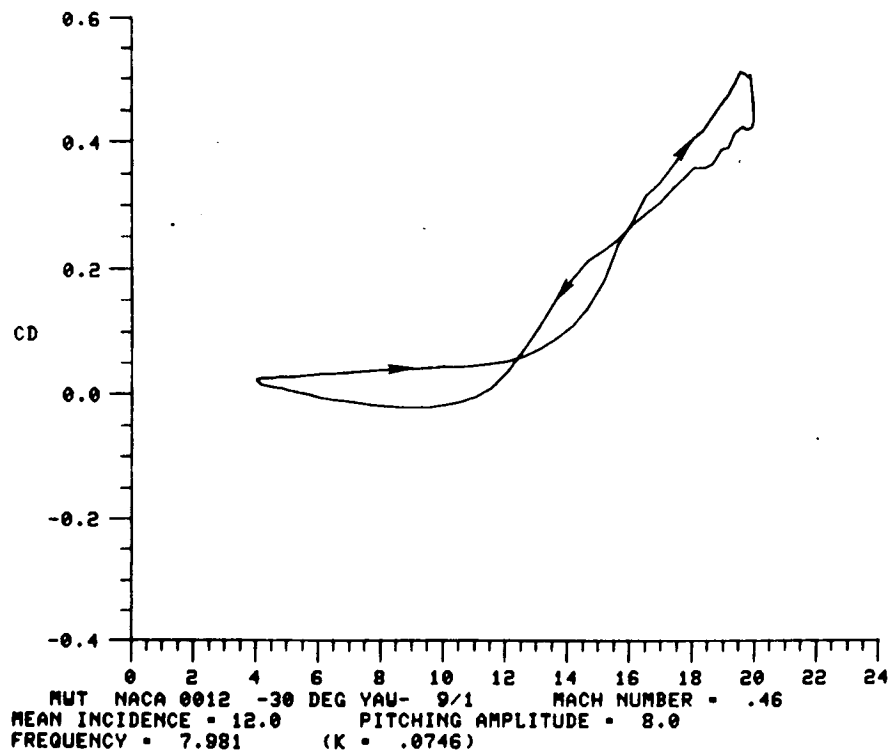
FILE 44. RUN1034.003



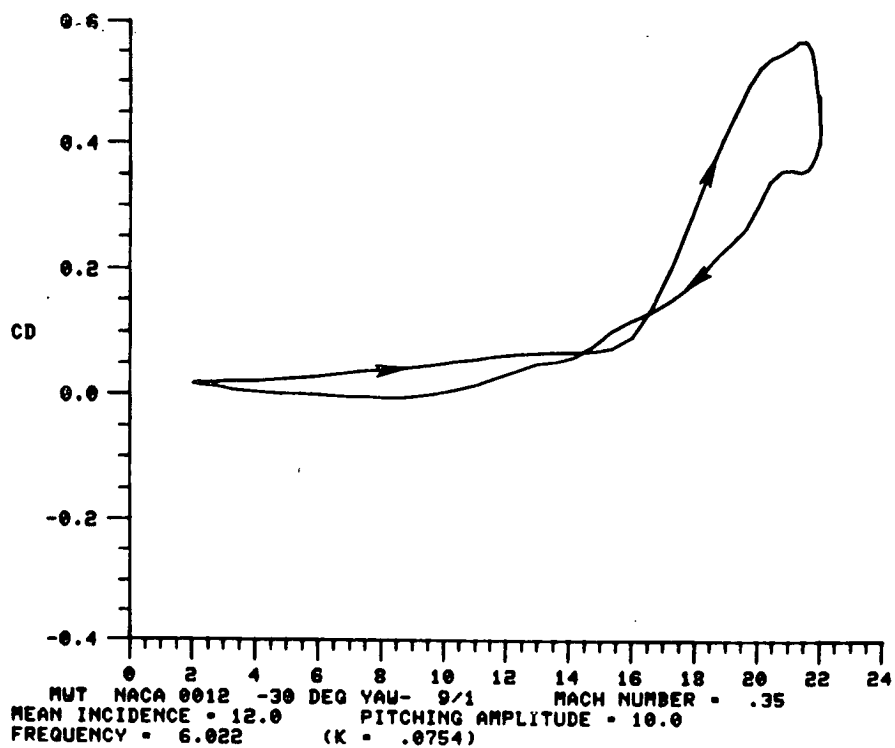
FILE 18. RUN1016.008



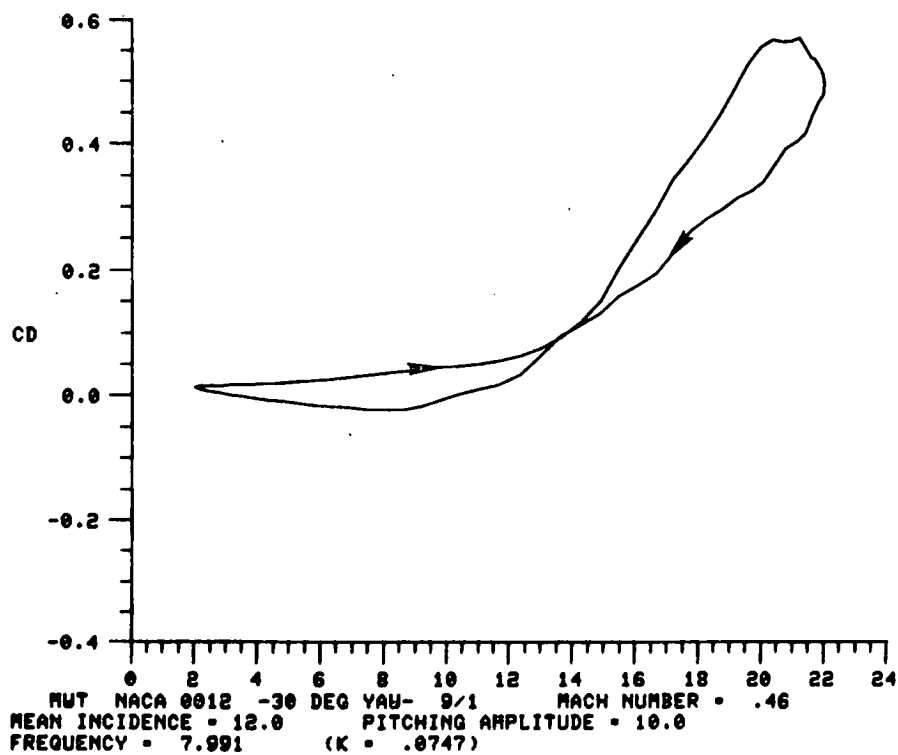
FILE 57. RUN1017.005



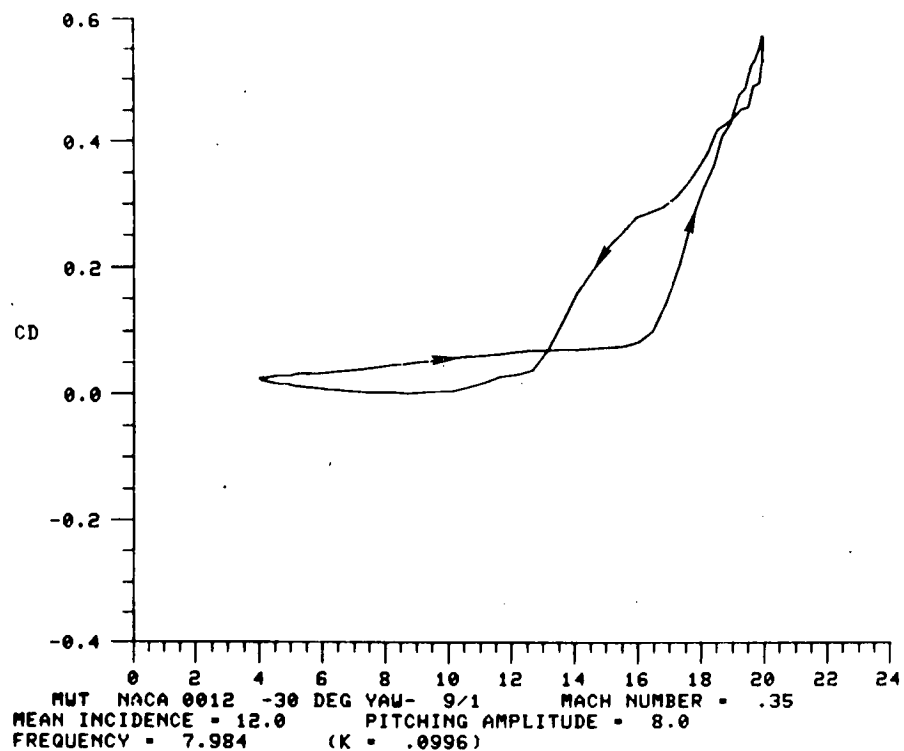
FILE 40. RUN1033.010



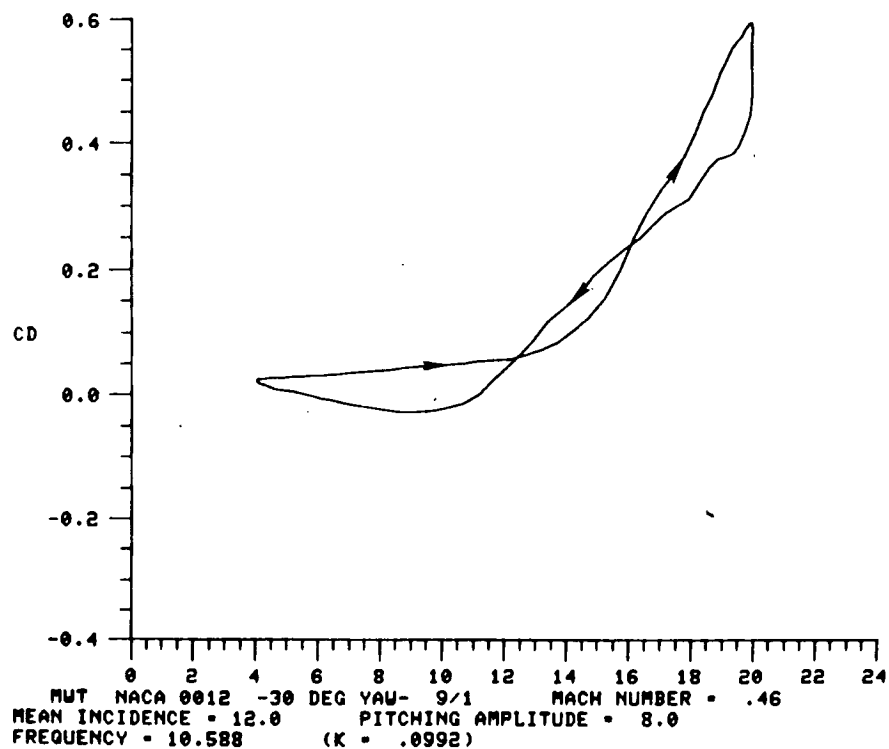
FILE 45. RUN1034.005



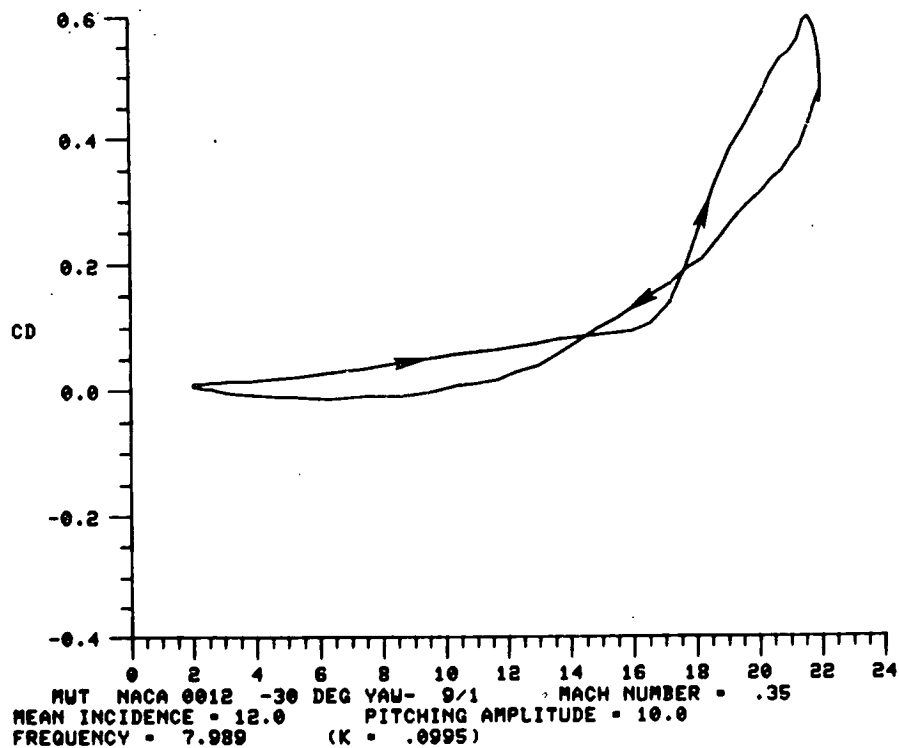
FILE 19. RUN1016.010



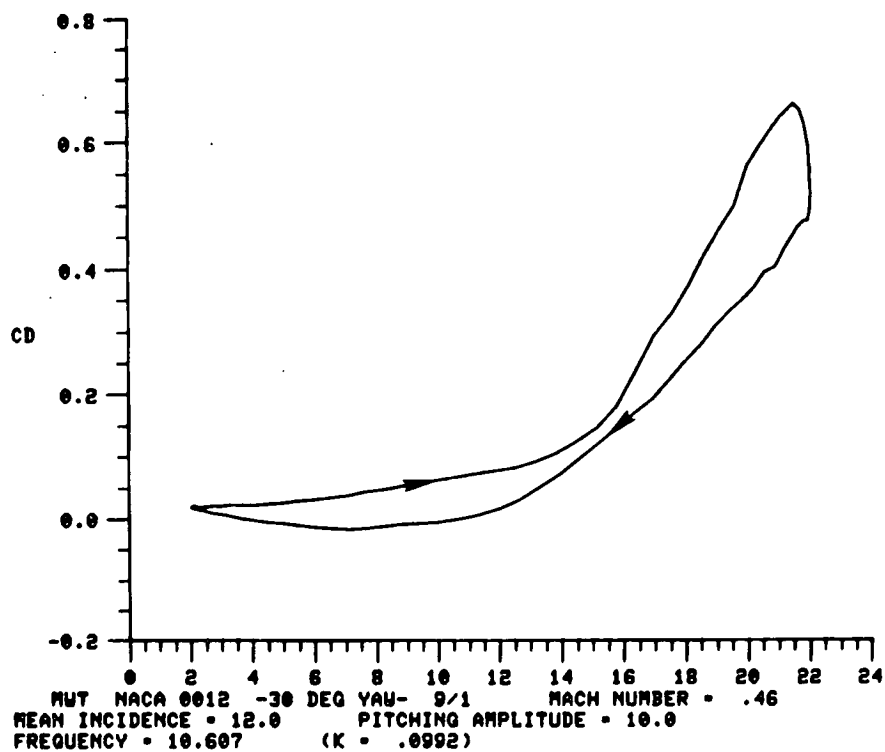
FILE 58. RUN1017.009



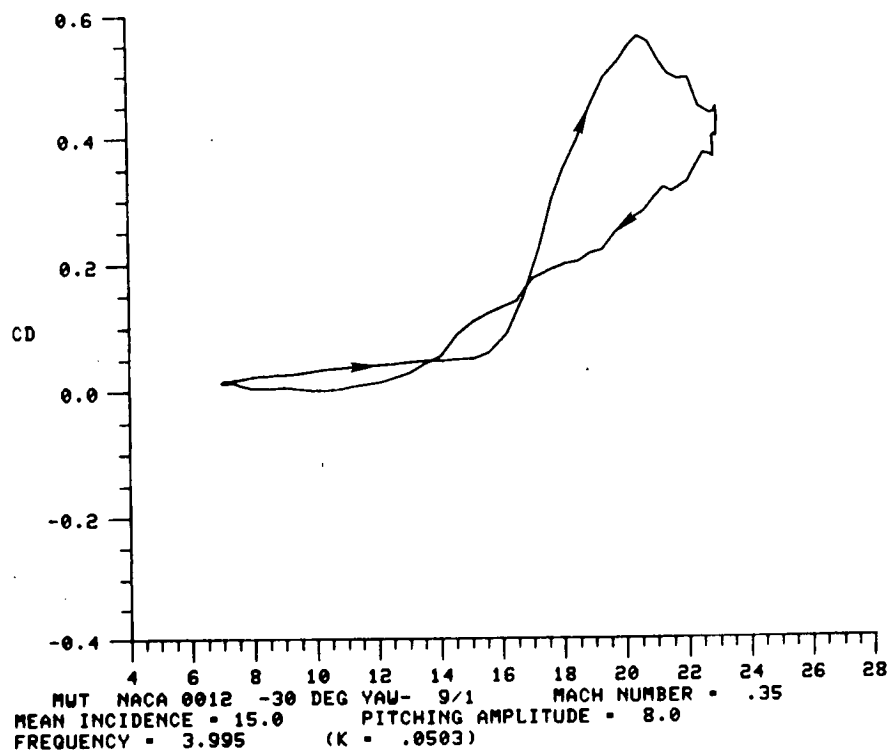
FILE 41. RUN1033.012



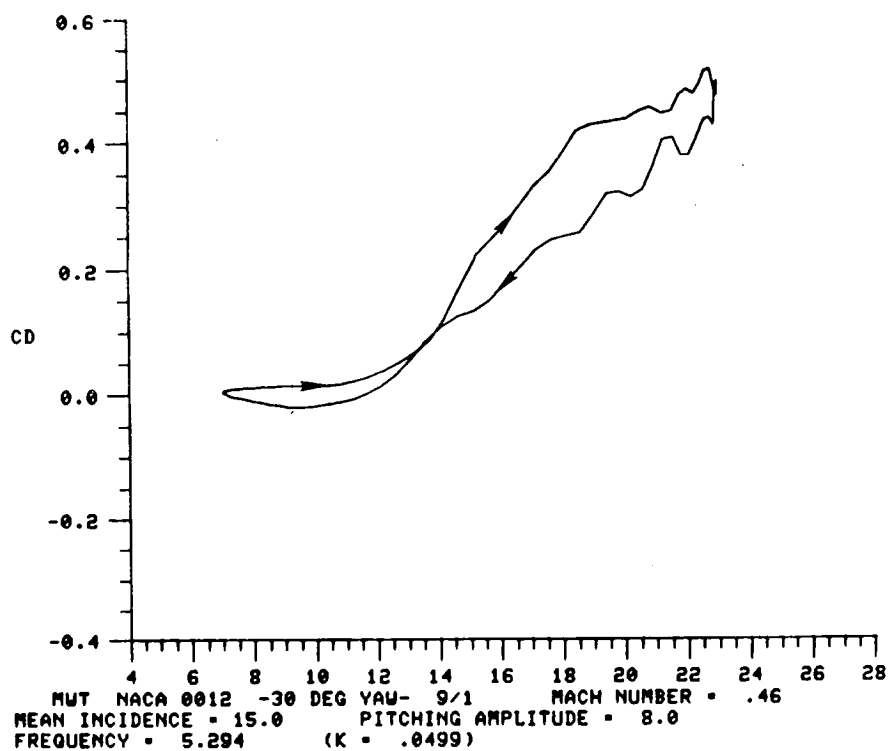
FILE 47. RUN1034.009



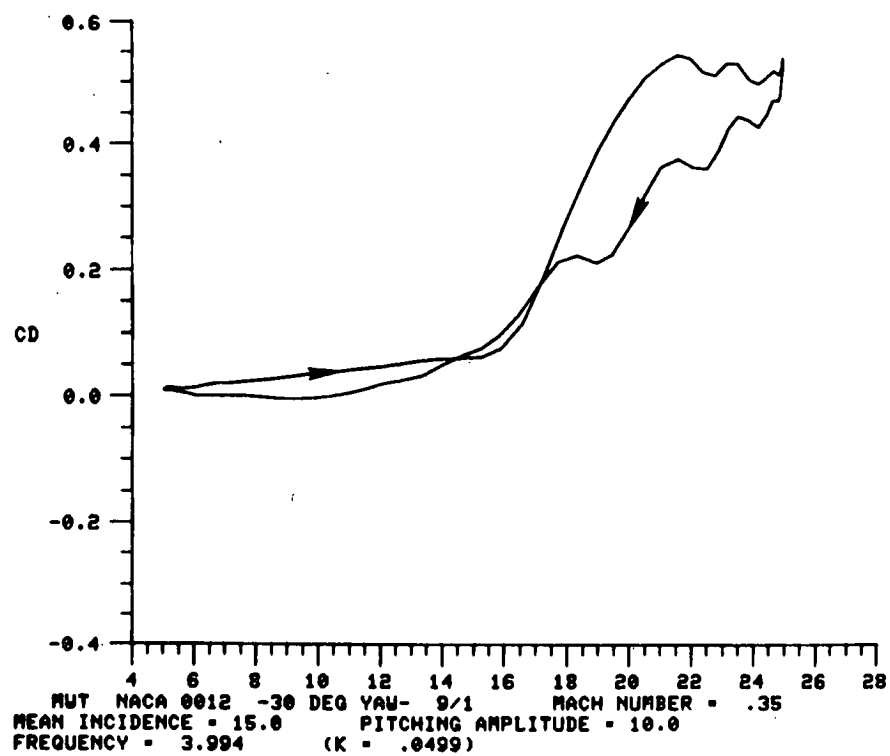
FILE 35. RUN1020.008



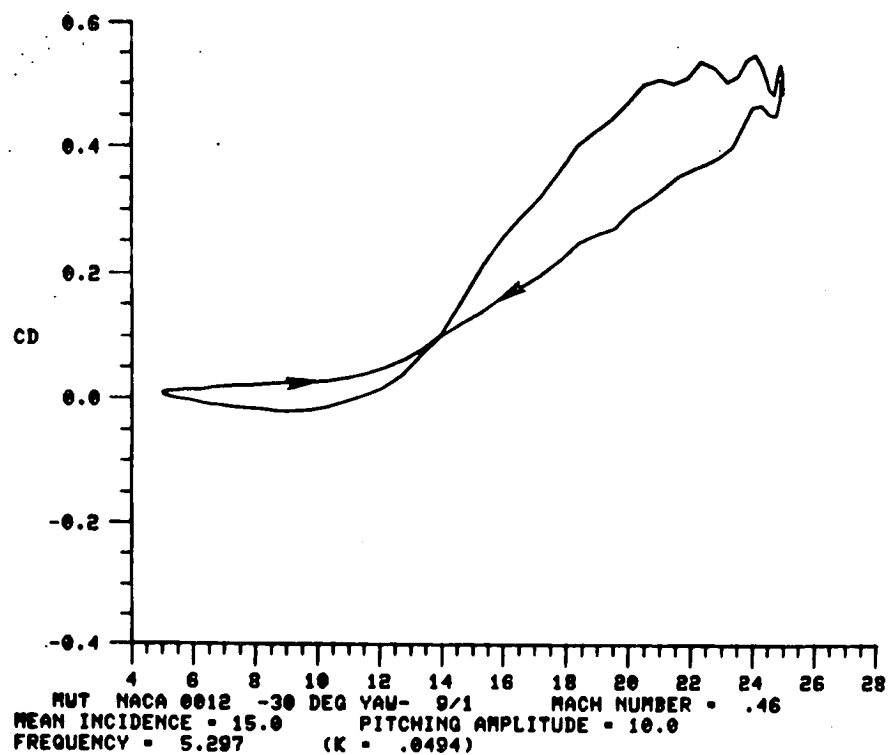
FILE 40. RUN1021.003



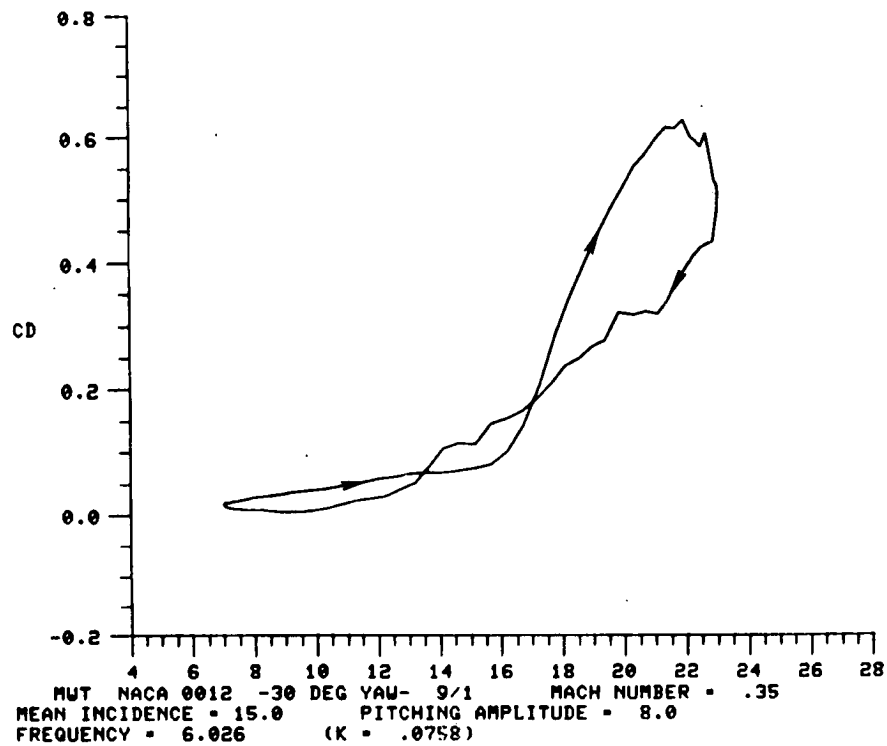
FILE 53. RUN1036.001



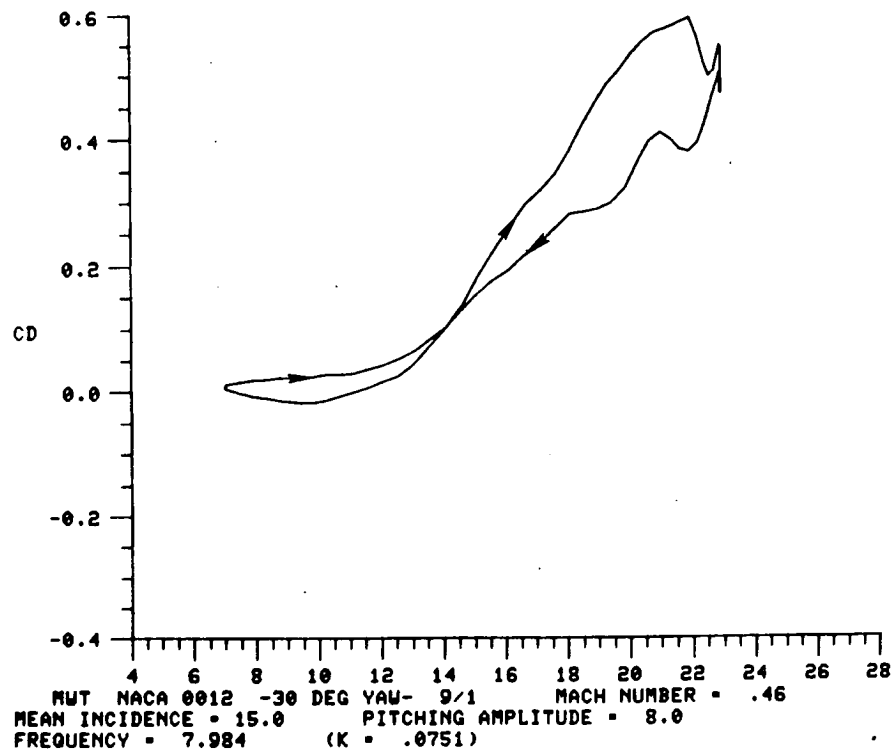
FILE 58. RUN1037.003



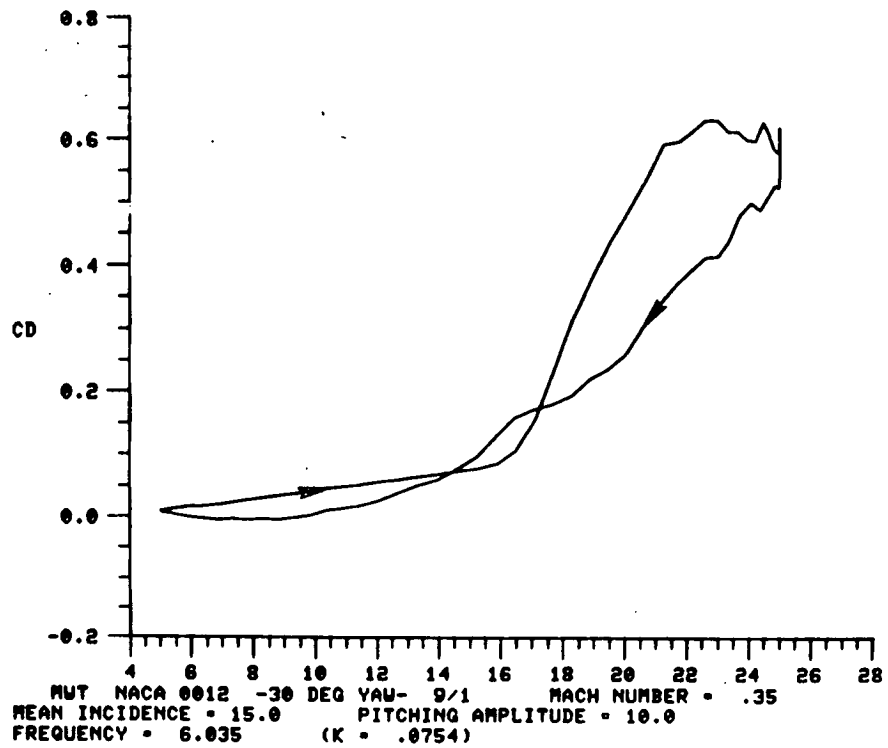
FILE 36. RUN1020.010



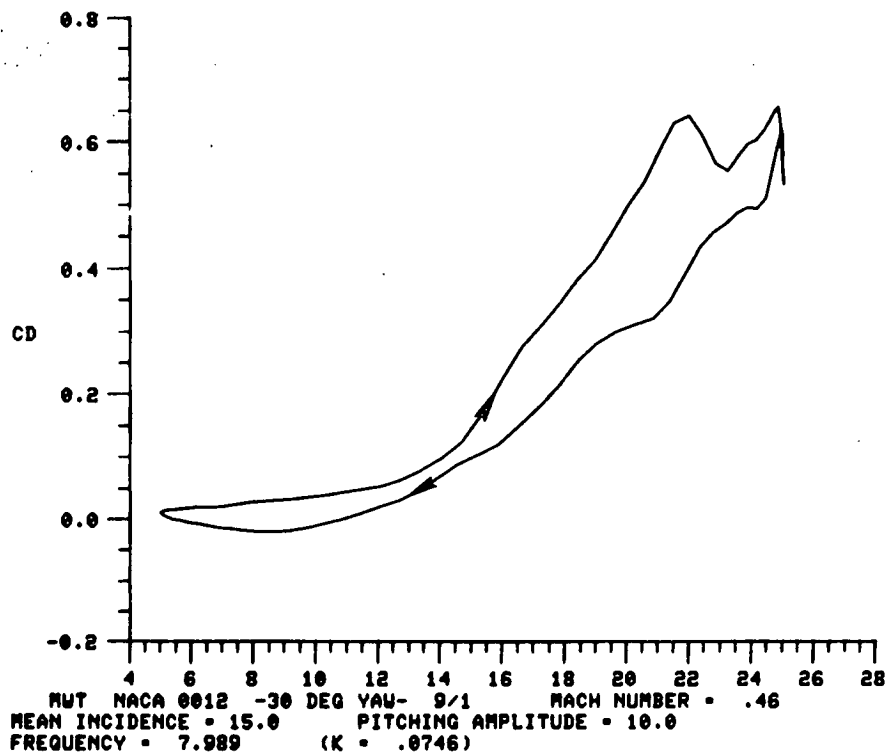
FILE 63, RUN1021.005



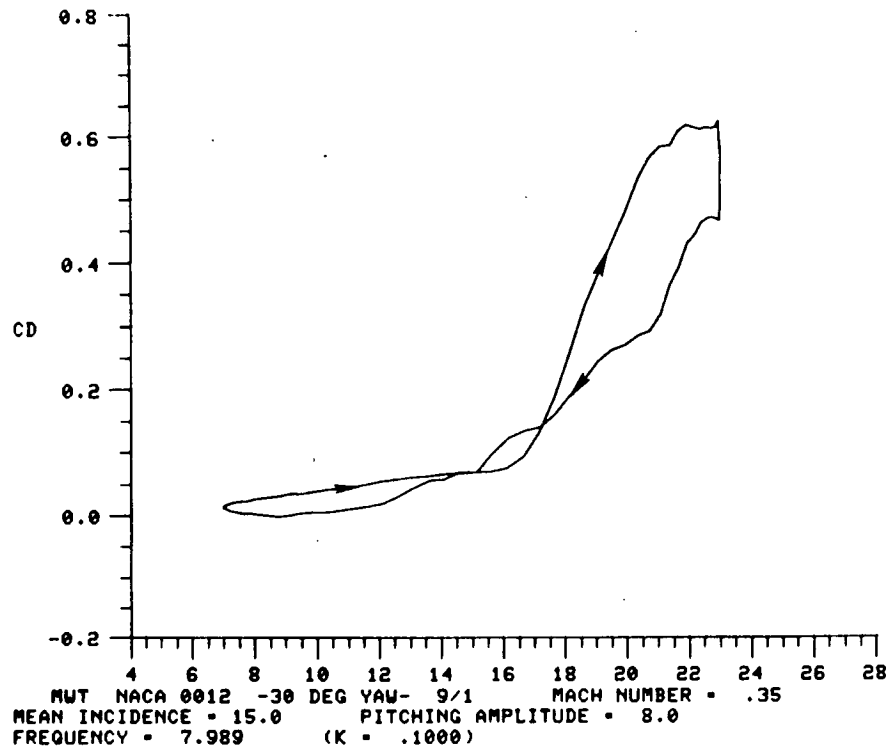
FILE 54. RUN1036.003



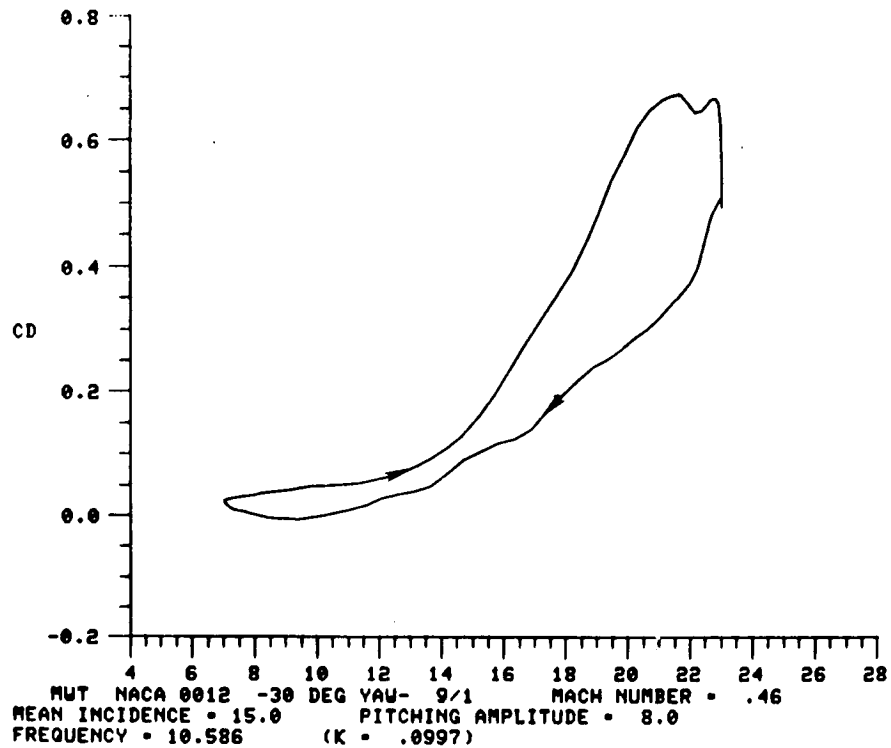
FILE 59. RUN1037.005



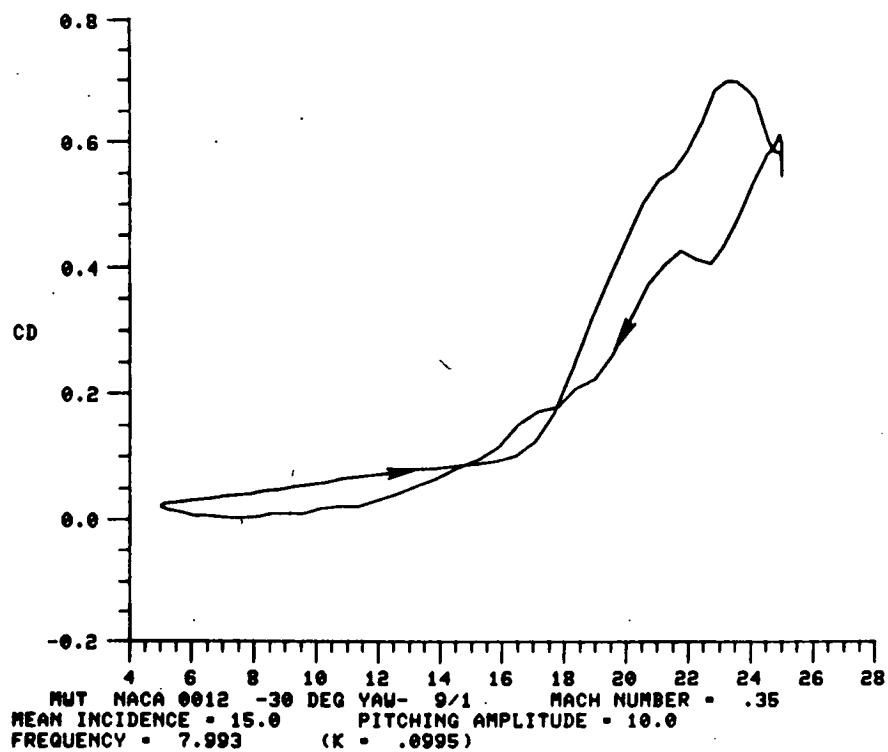
FILE 37. RUN1020.012



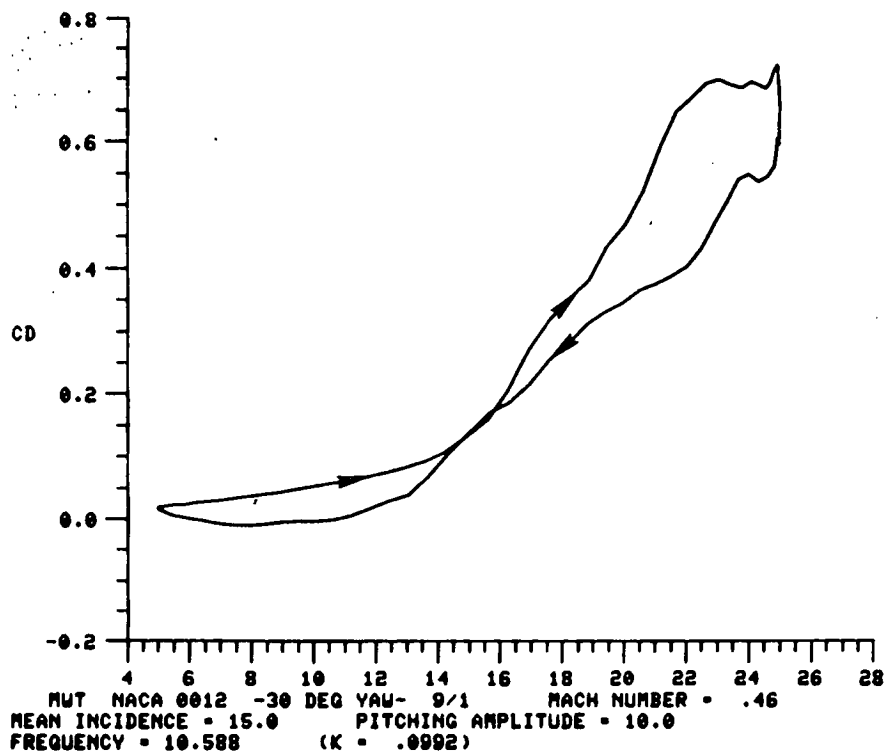
FILE 65. RUN1021.010



FILE 55. RUN1036.005



FILE 61. RUN1037.009

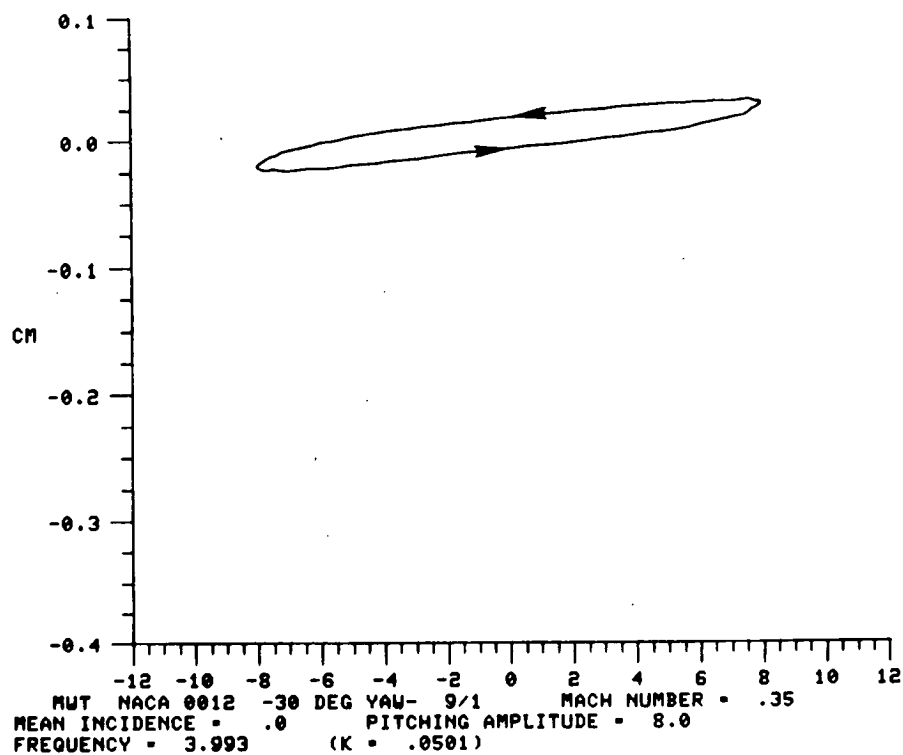


EFFECT OF MACH NUMBER ON THE SWEPT WING MOMENT RESPONSE *

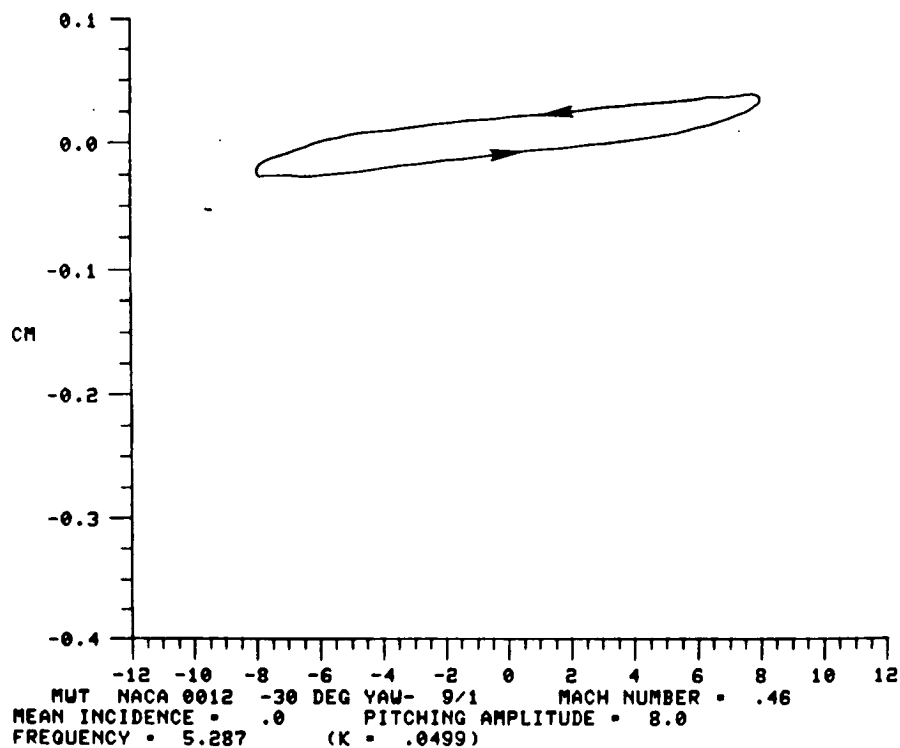
<u>Mean Incidence Angle</u>	<u>Reduced Frequency</u>	<u>Page *</u>
0	.050	362, 363
↓	.075	364, 365
↓	.100	366, 367
9	.050	368, 369
↓	.075	370, 371
↓	.100	372, 373
12	.050	374, 375
↓	.075	376, 377
↓	.100	378, 379
15	.050	380, 381
↓	.075	382, 383
↓	.100	384, 385

* The effect of Mach number is shown for pitching amplitudes of 8 deg. (even-numbered pages) and 10 deg. (odd-numbered pages).

FILE 8. RUN1007.005



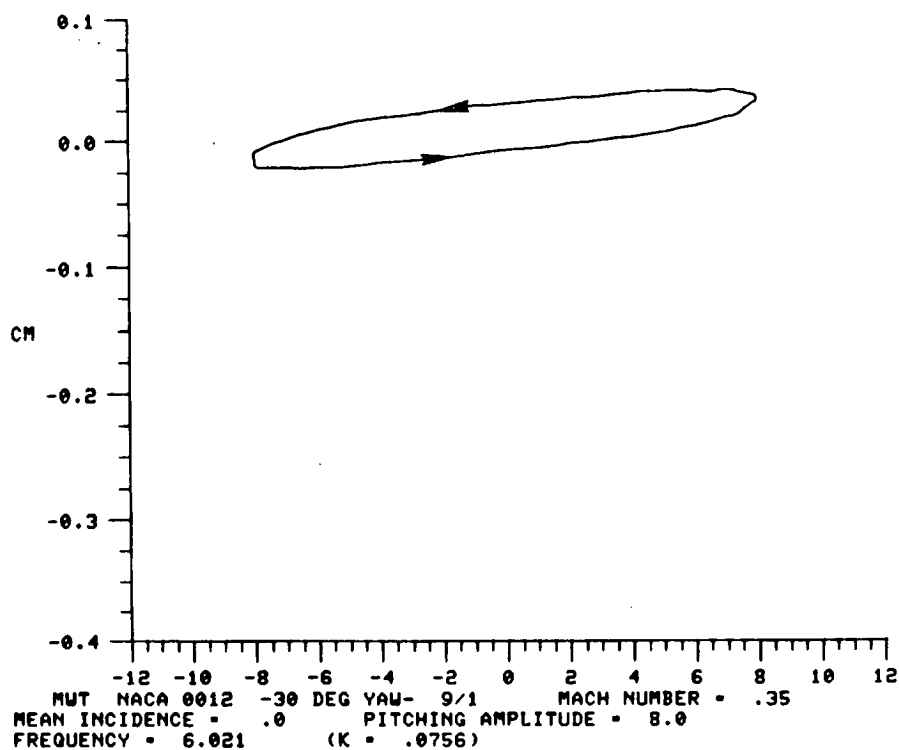
FILE 13. RUN1008.003



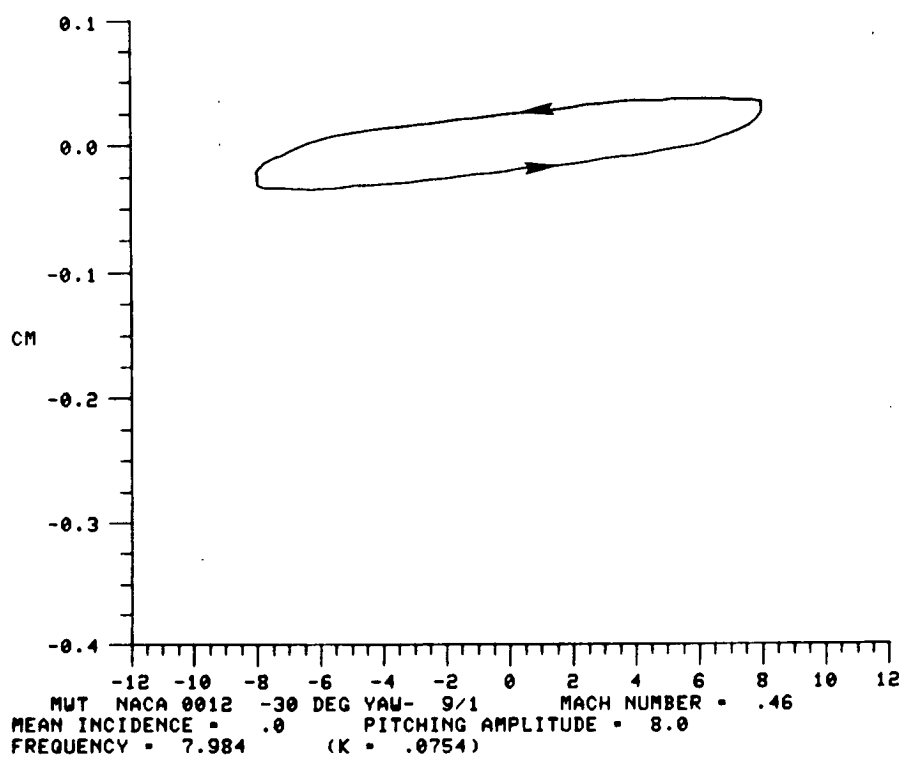
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 9. RUN1007.007



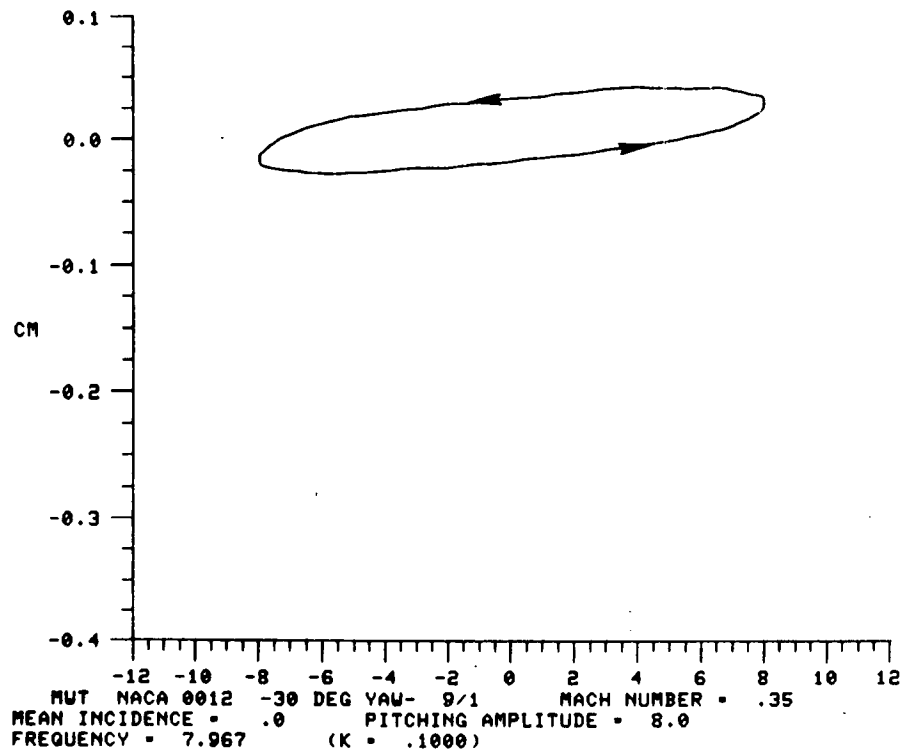
FILE 14. RUN1008.005



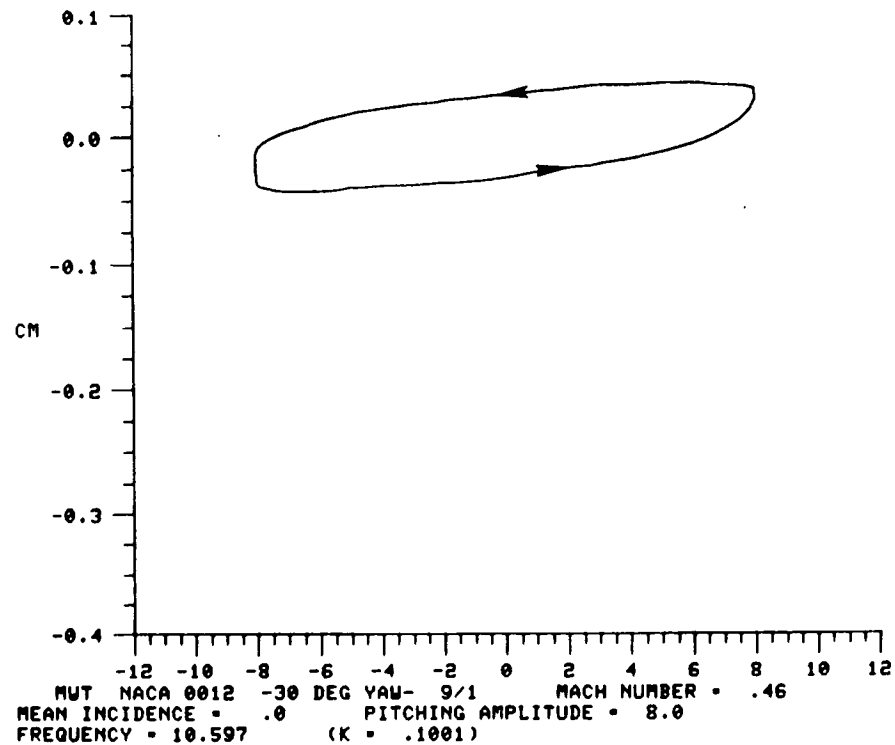
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

FILE 10. RUN1007.009



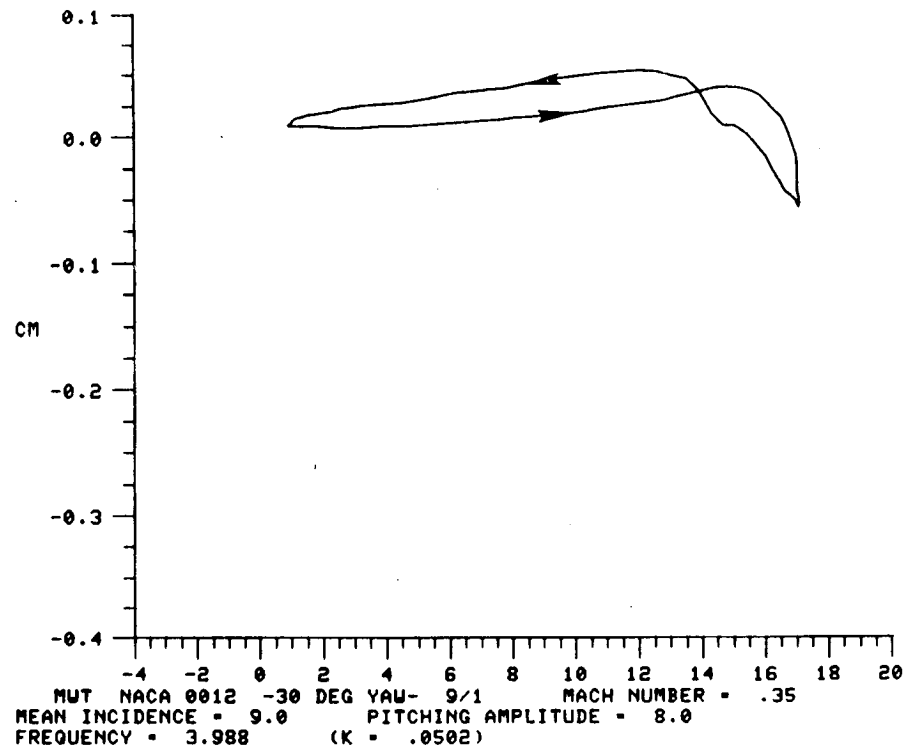
FILE 49. RUN1008.009



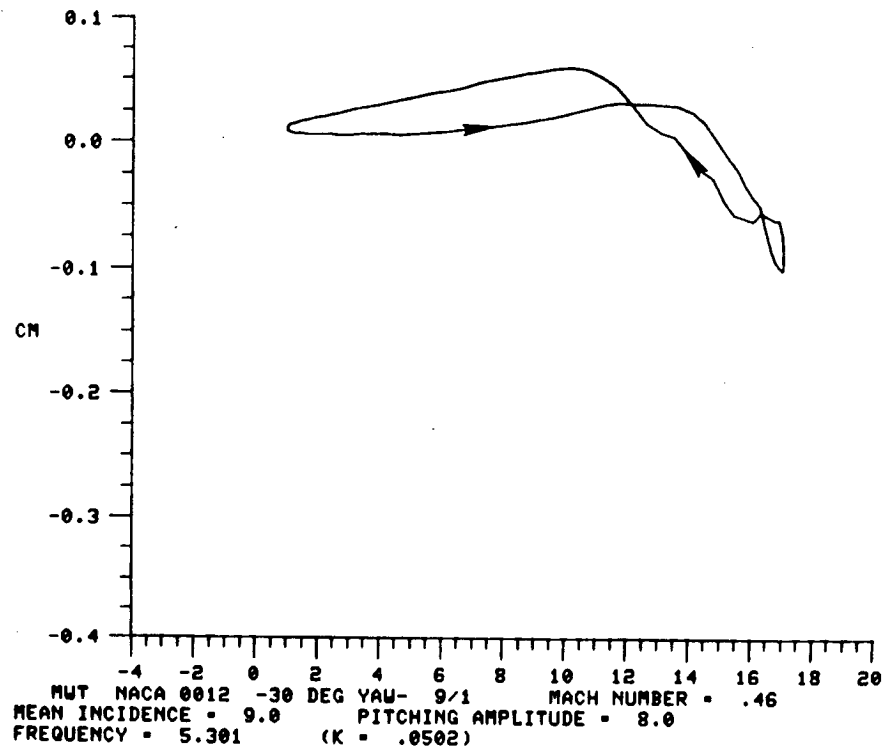
DATA WERE NOT OBTAINED

DATA WERE NOT OBTAINED

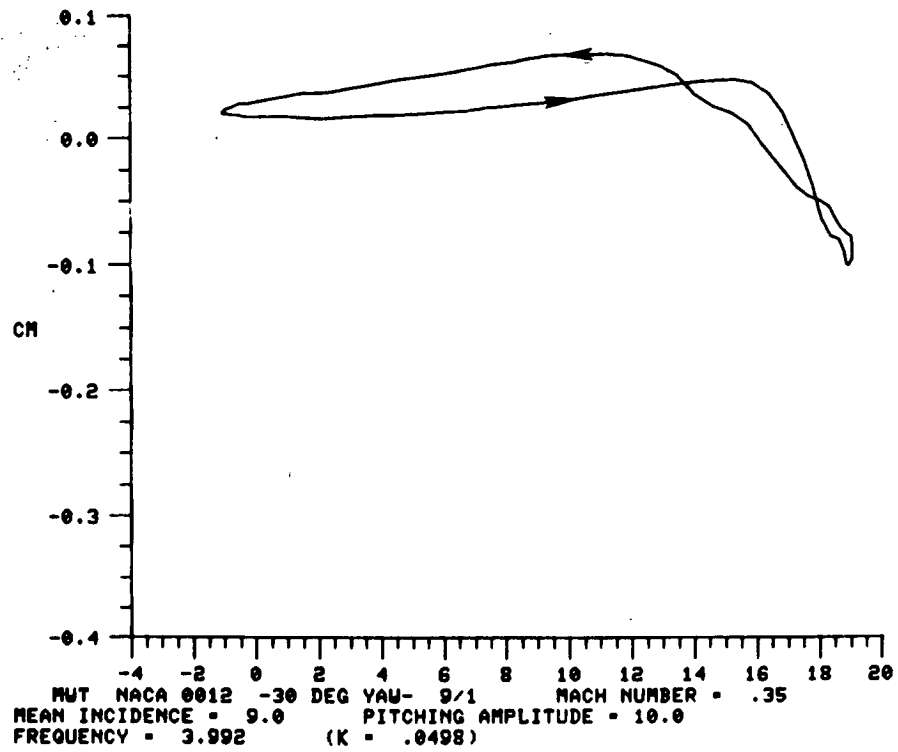
FILE 26. RUN1018.013



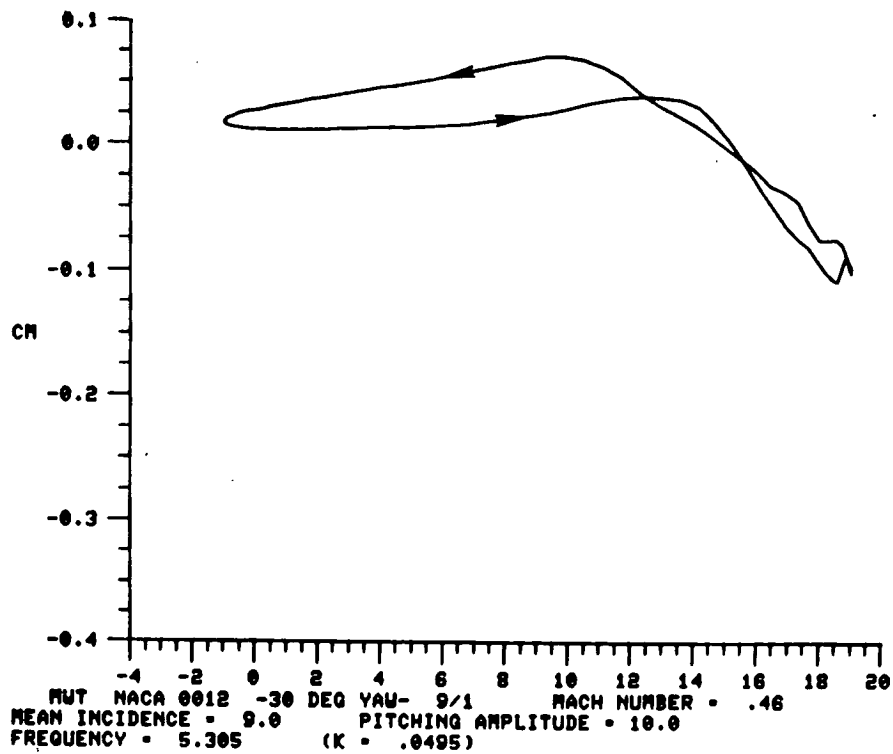
FILE 31. RUN1019.003



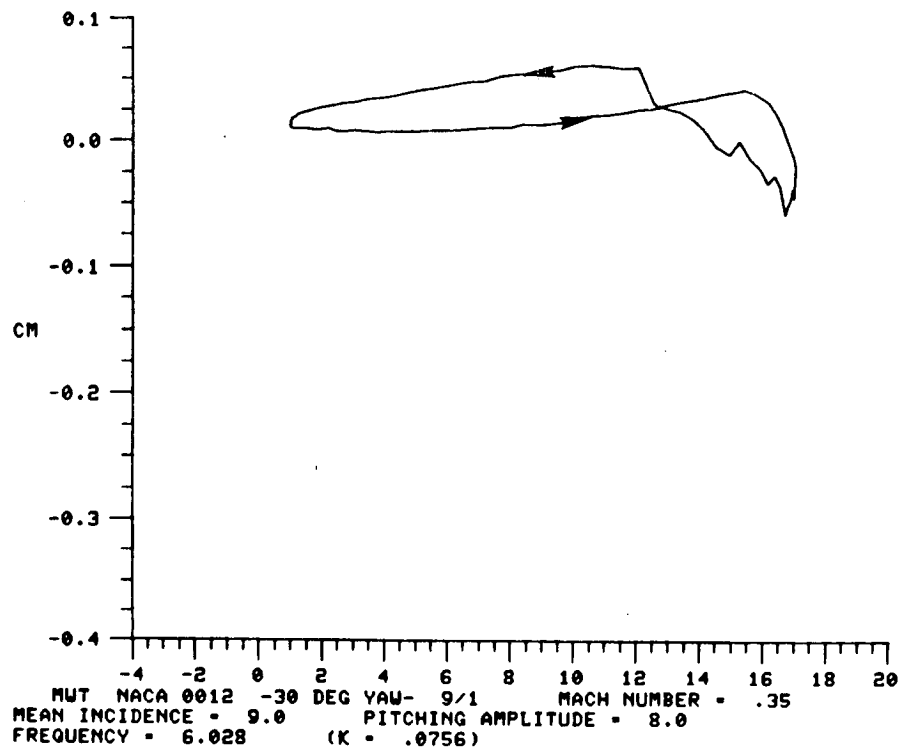
FILE 6. RUN1029.008



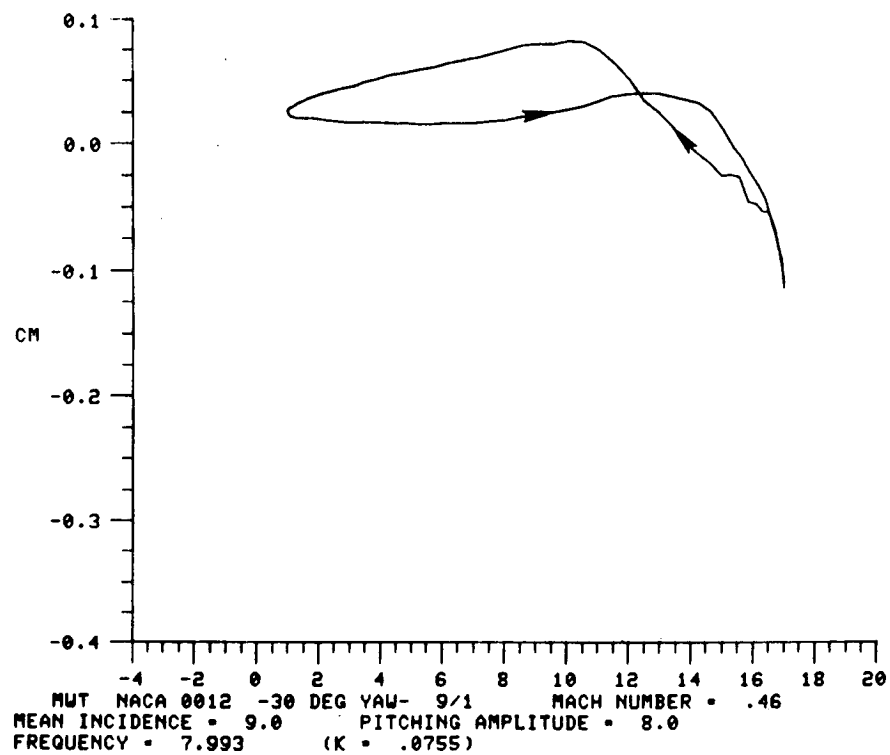
FILE 11. RUN1030.003



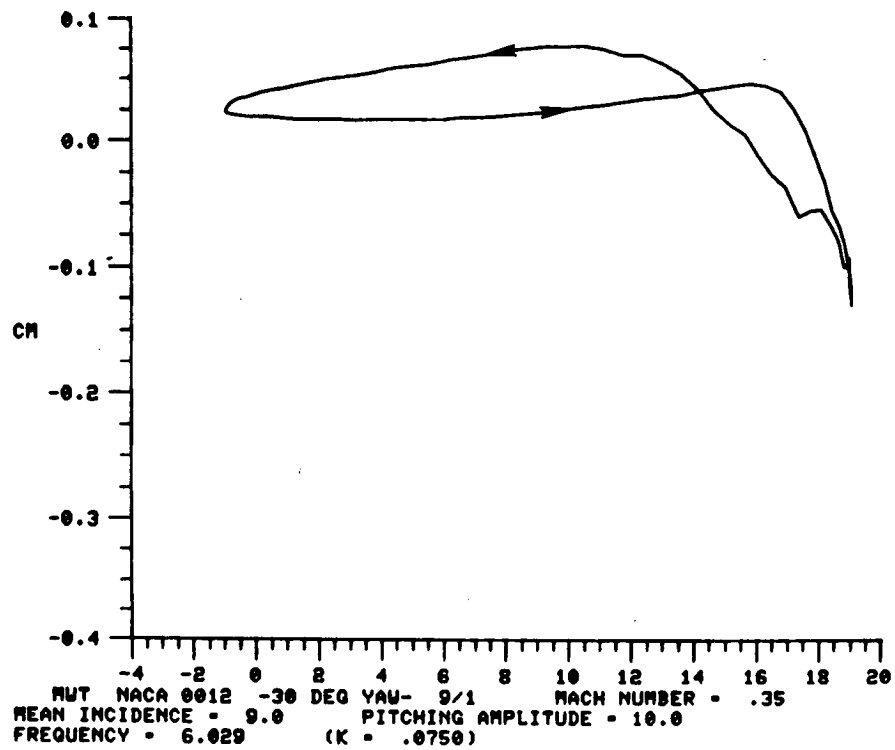
FILE 27. RUN1018.015



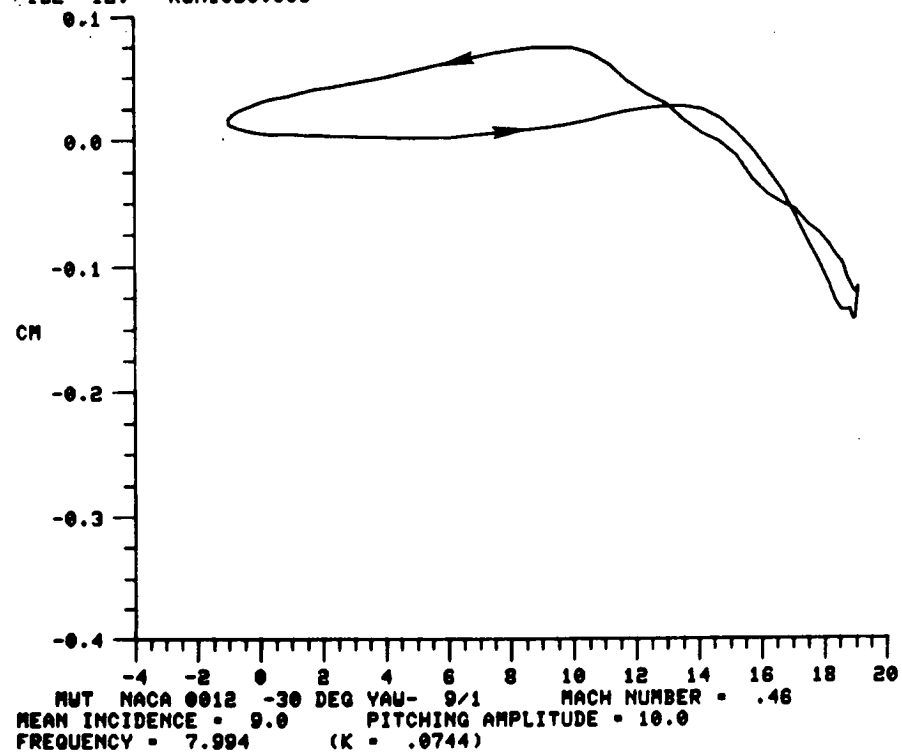
FILE 32. RUN1019.005



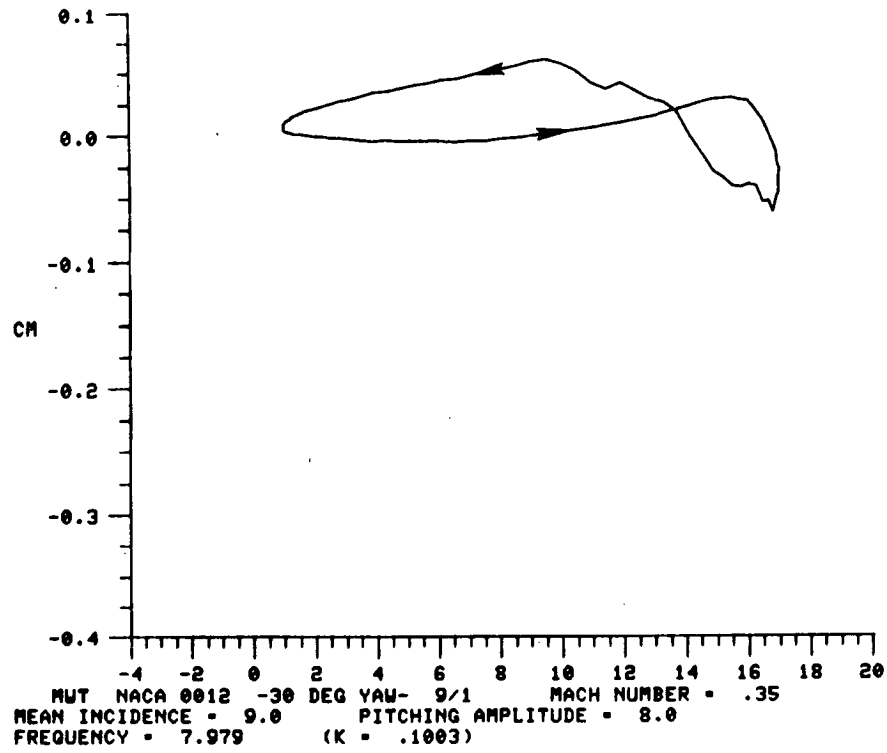
FILE 7. RUN1029.010



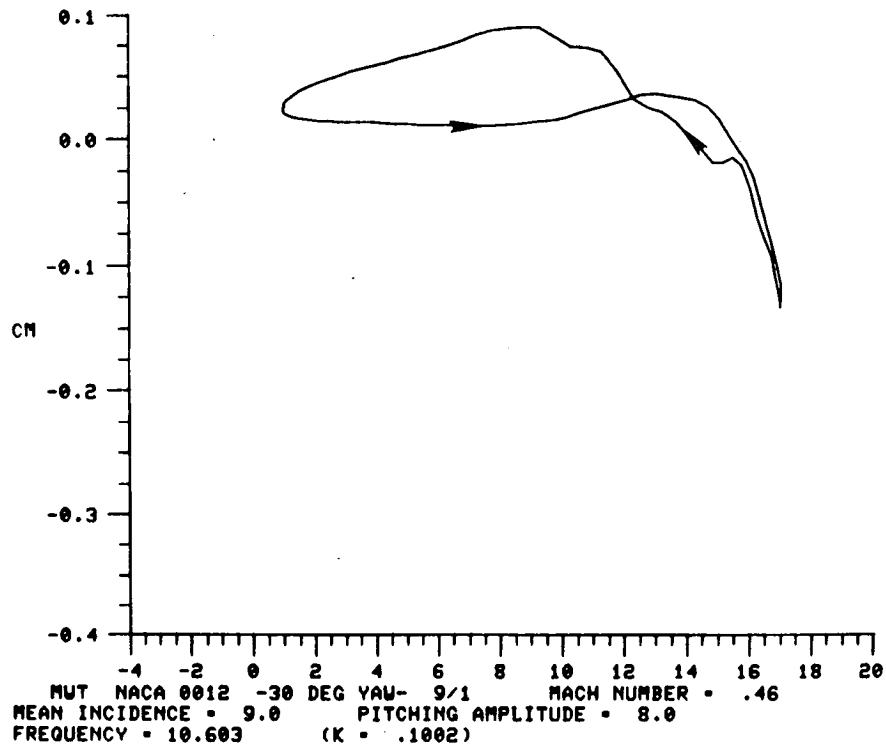
FILE 12. RUN1030.005



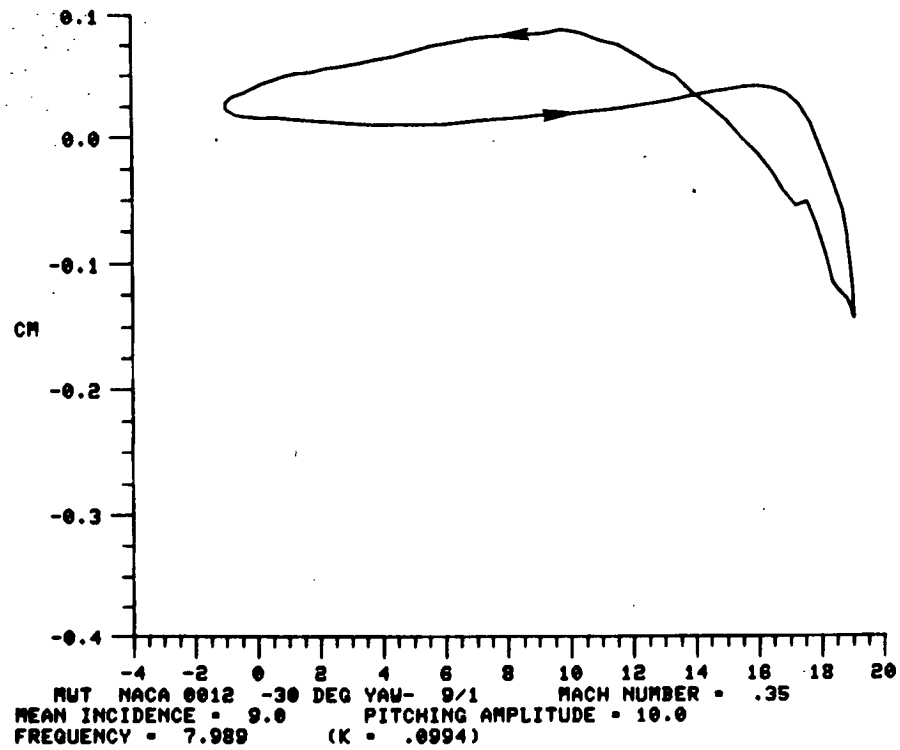
FILE 28. RUN1018.017



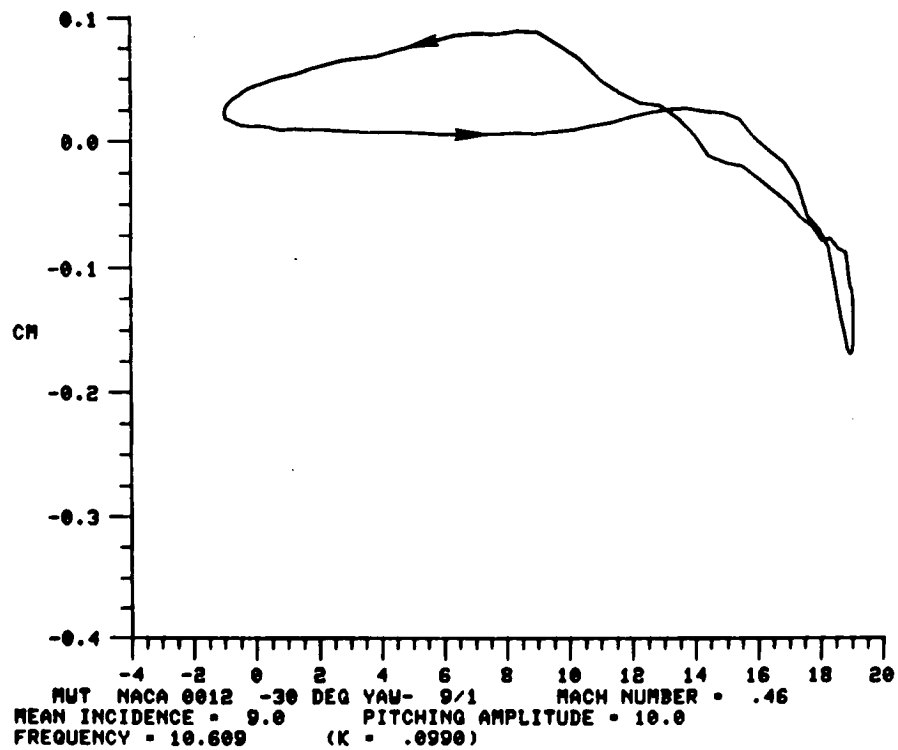
FILE 34. RUN1019.009



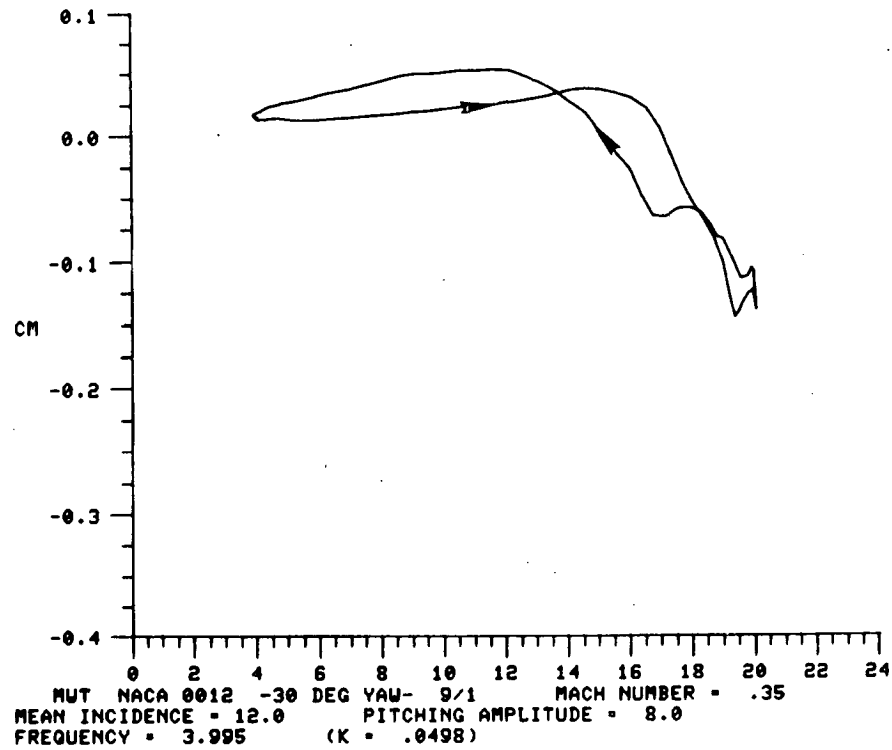
FILE 8. RUN1029.012



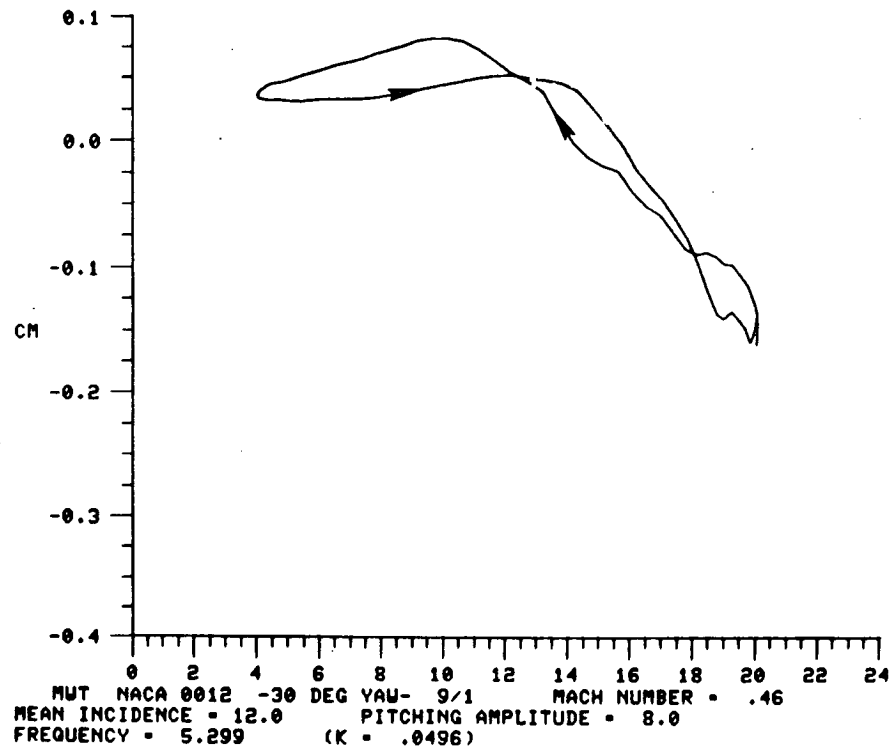
FILE 14. RUN1030.009



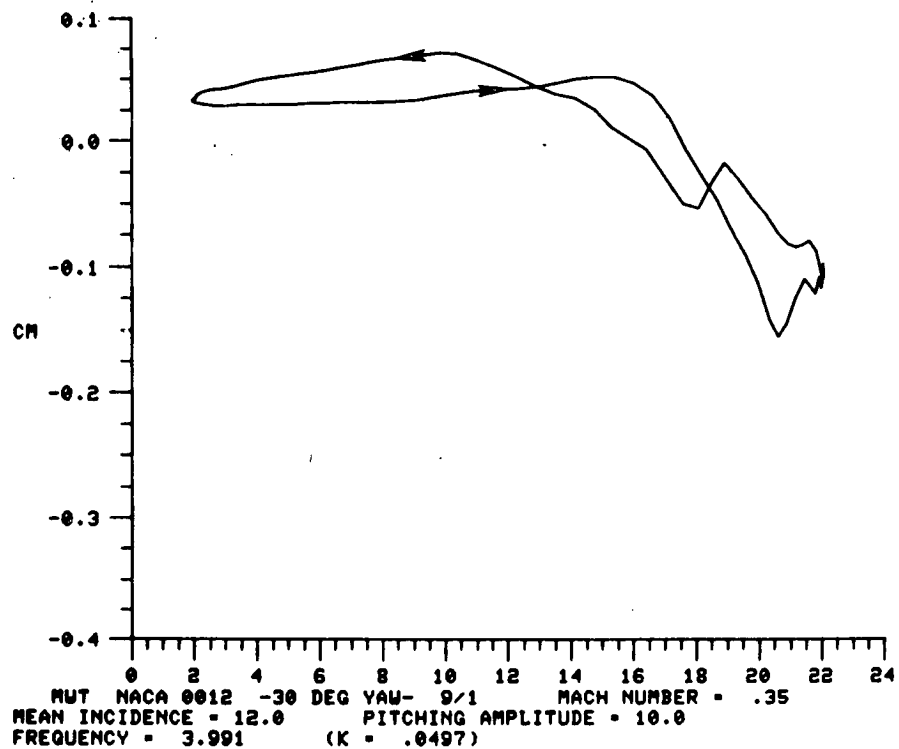
FILE 53. RUN1016.004



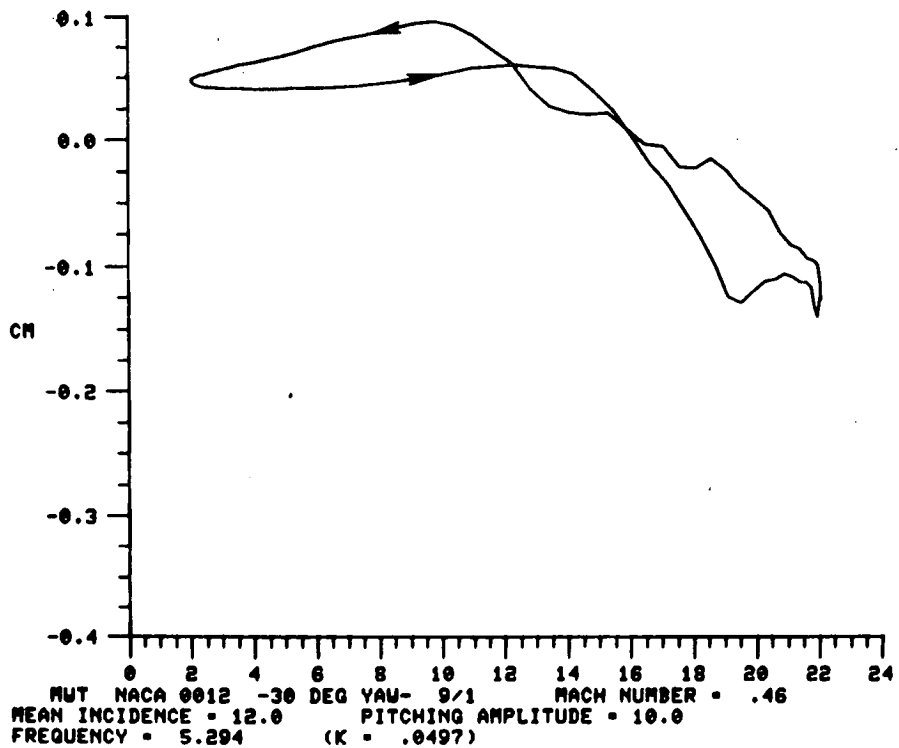
FILE 56. RUN1017.003



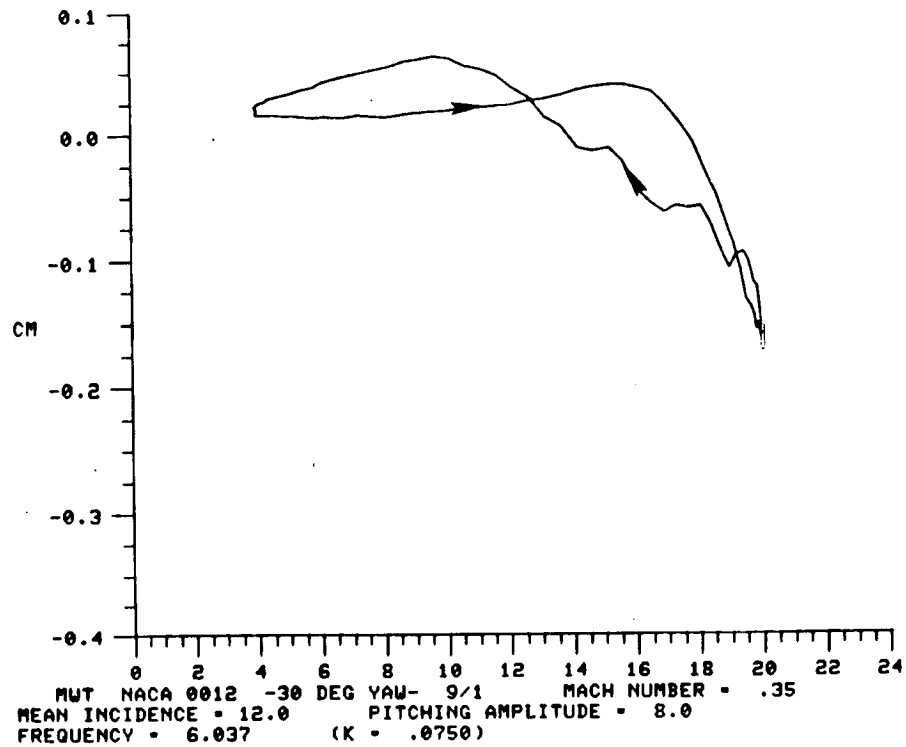
FILE 39. RUN1033.008



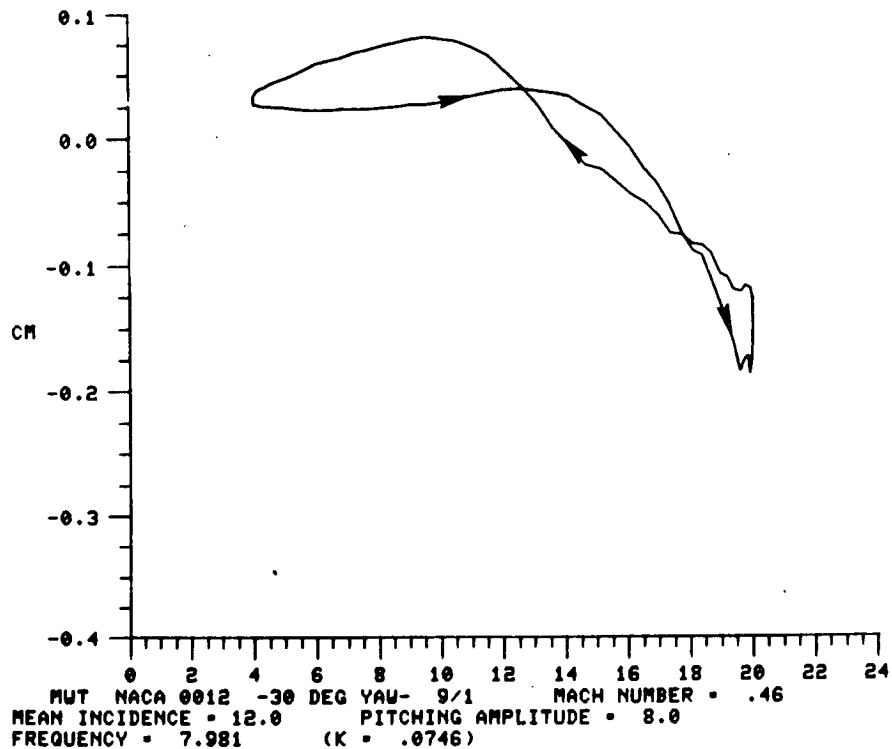
FILE 44. RUN1034.003



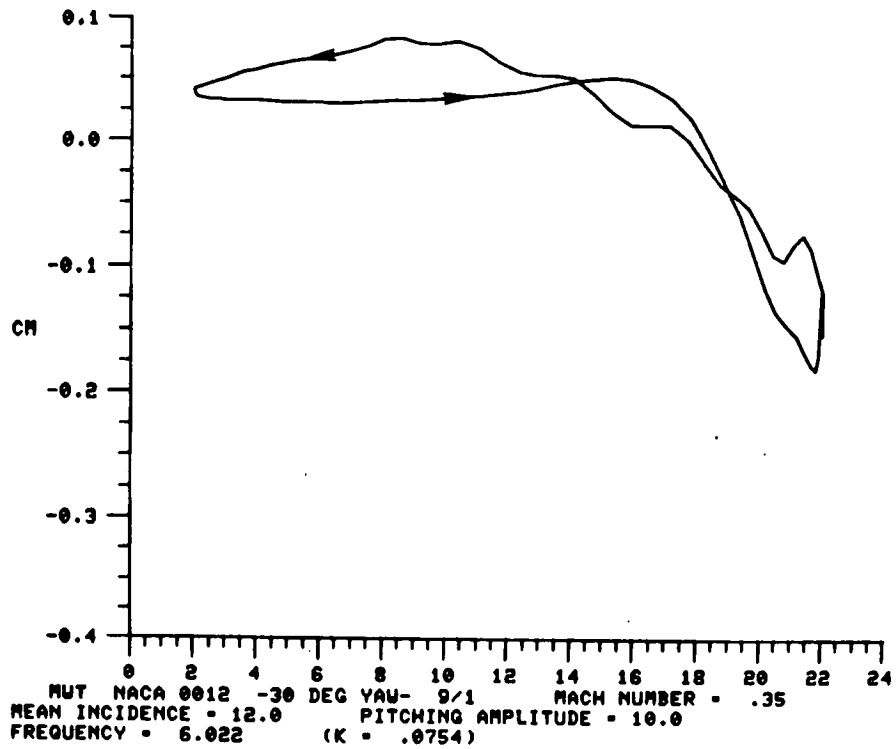
FILE 18. RUN1016.008



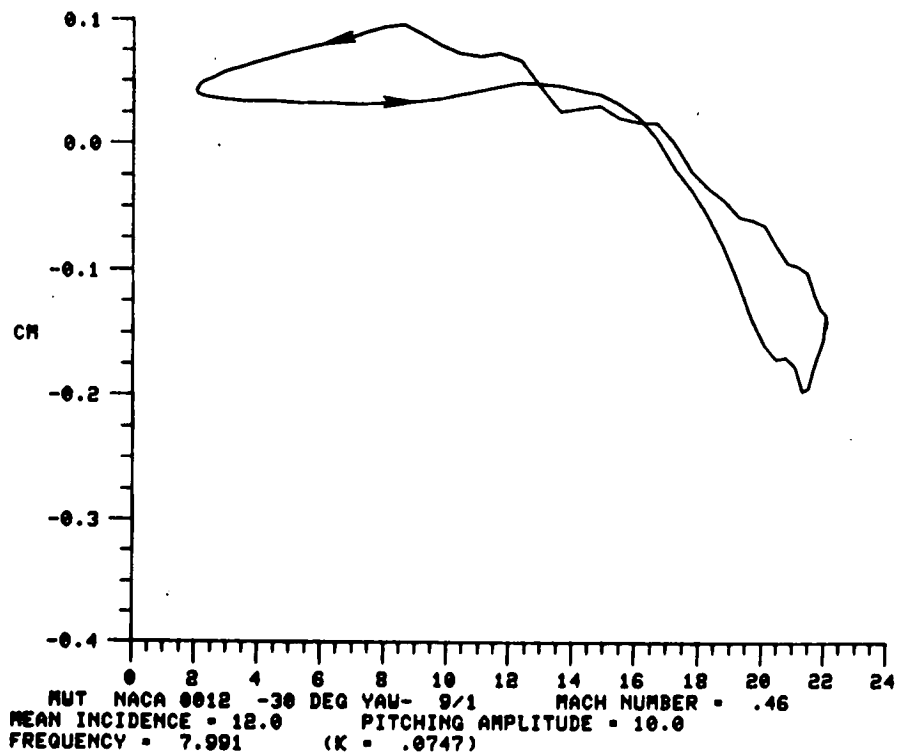
FILE 57. RUN1017.005



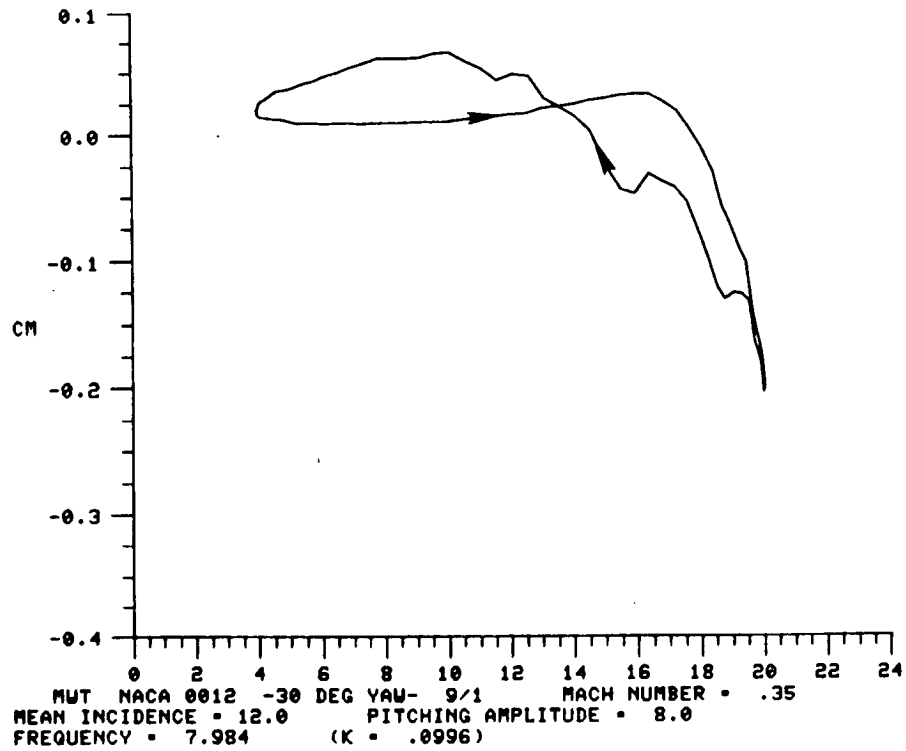
FILE 40. RUN1033.010



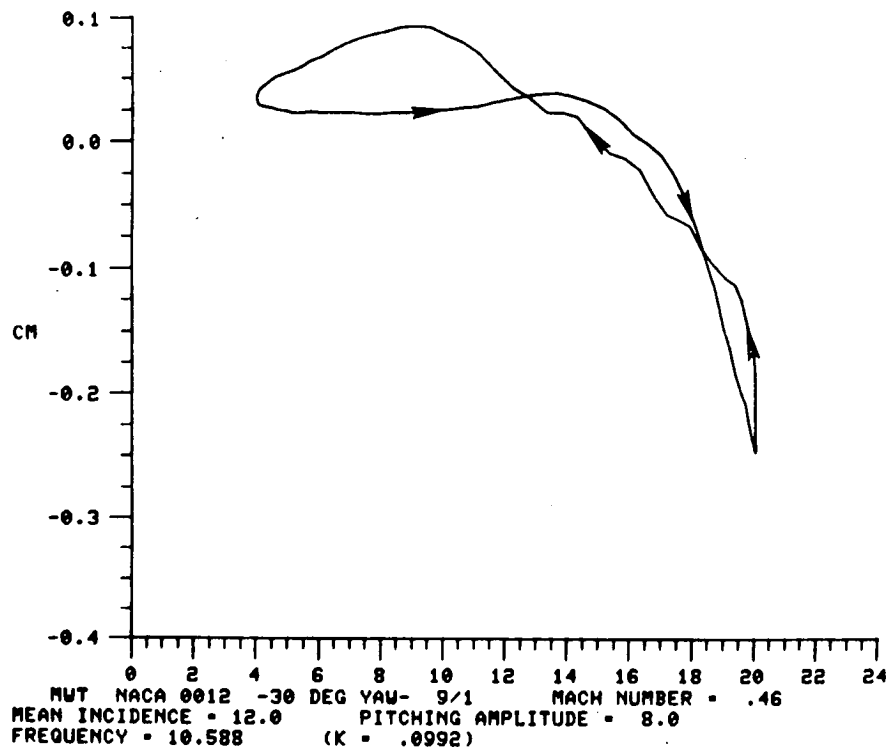
FILE 45. RUN1034.005



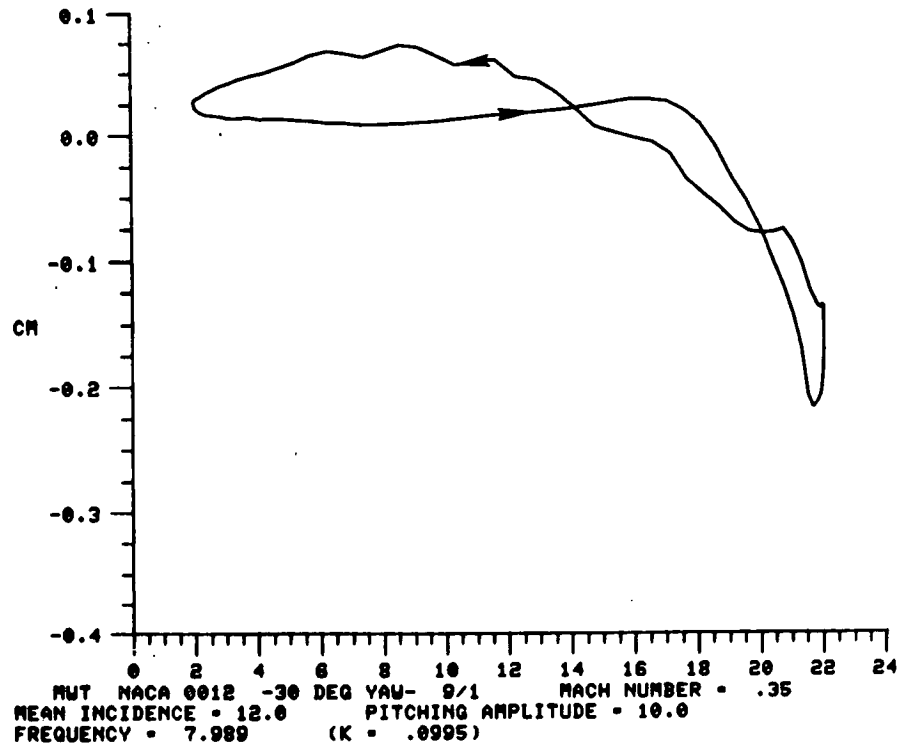
FILE 19. RUN1016.010



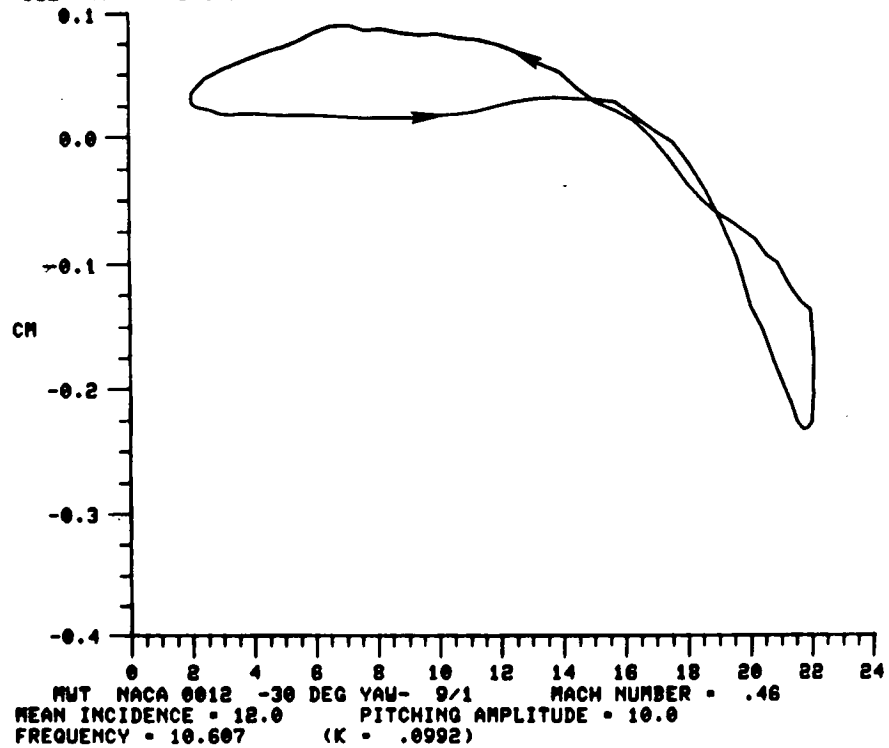
FILE 58. RUN1017.009



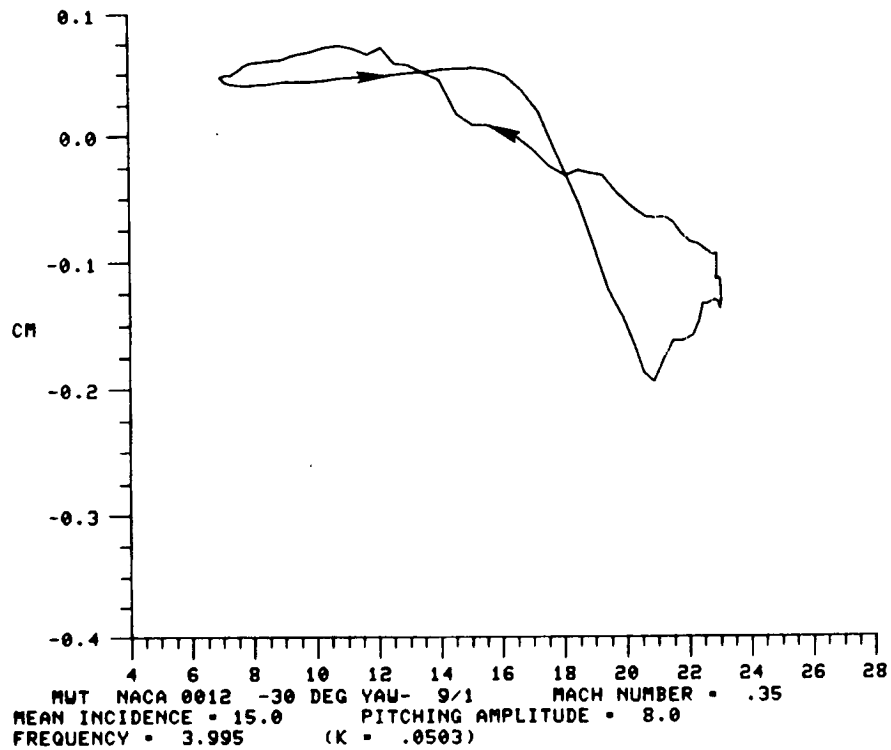
FILE 41. RUN1033.012



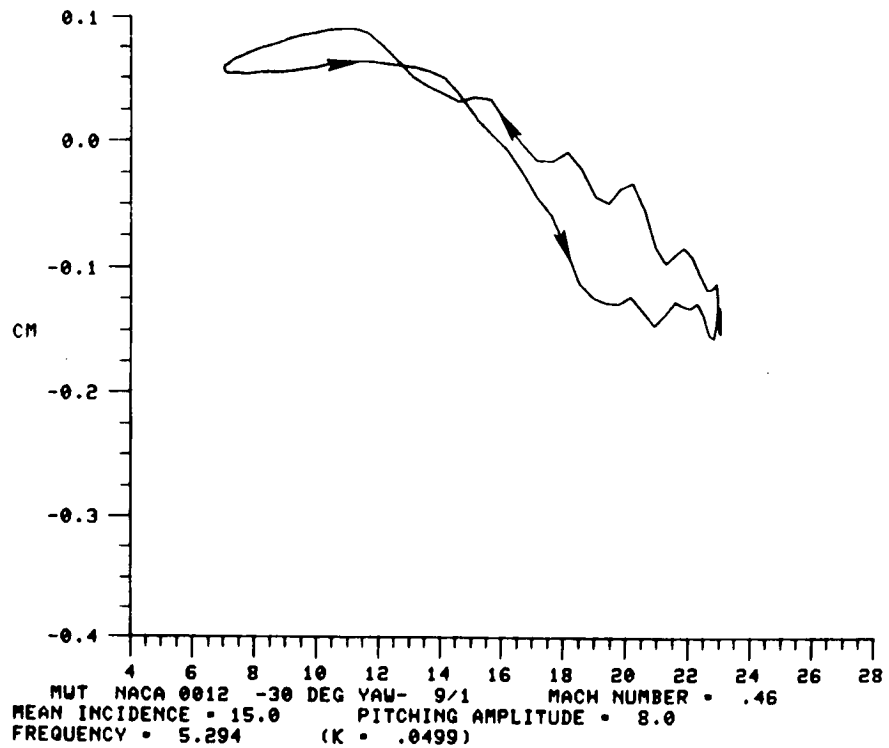
FILE 47. RUN1034.009



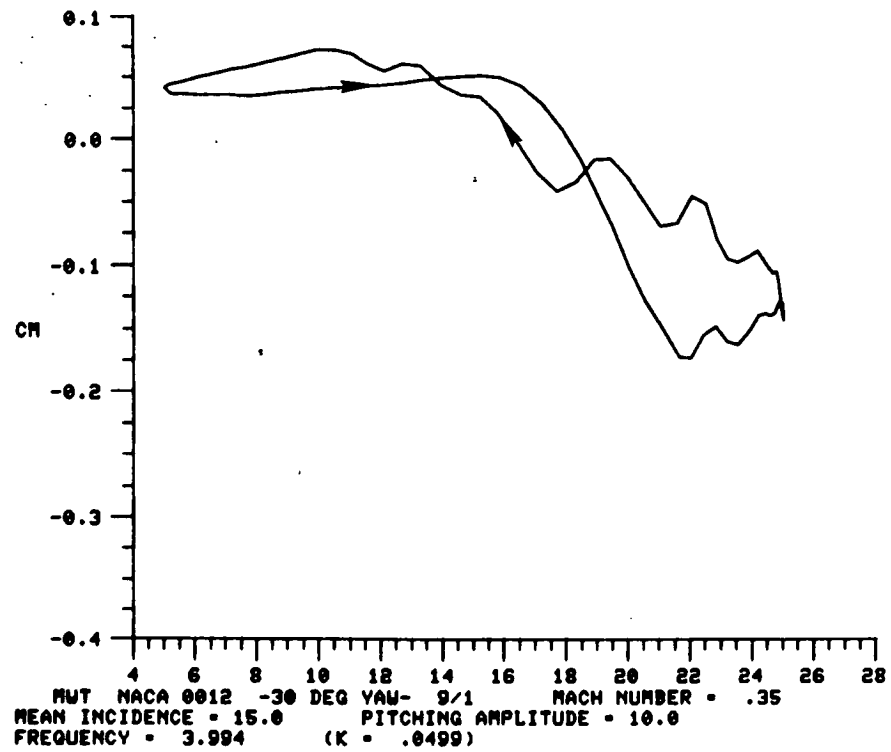
FILE 35. RUN1020.008



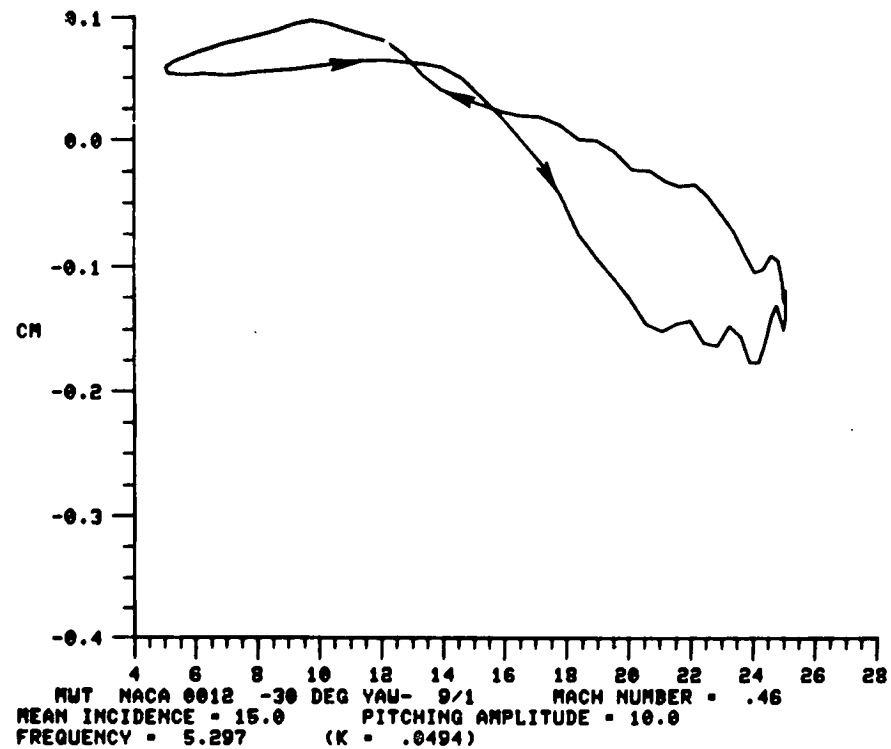
FILE 40. RUN1021.003



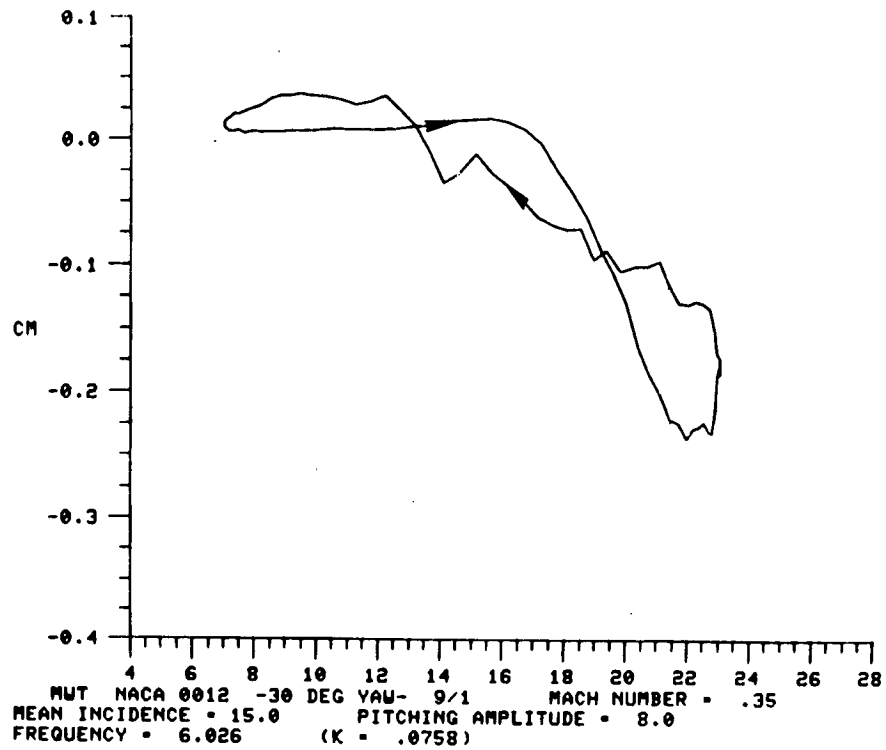
FILE 53. RUN1036.001



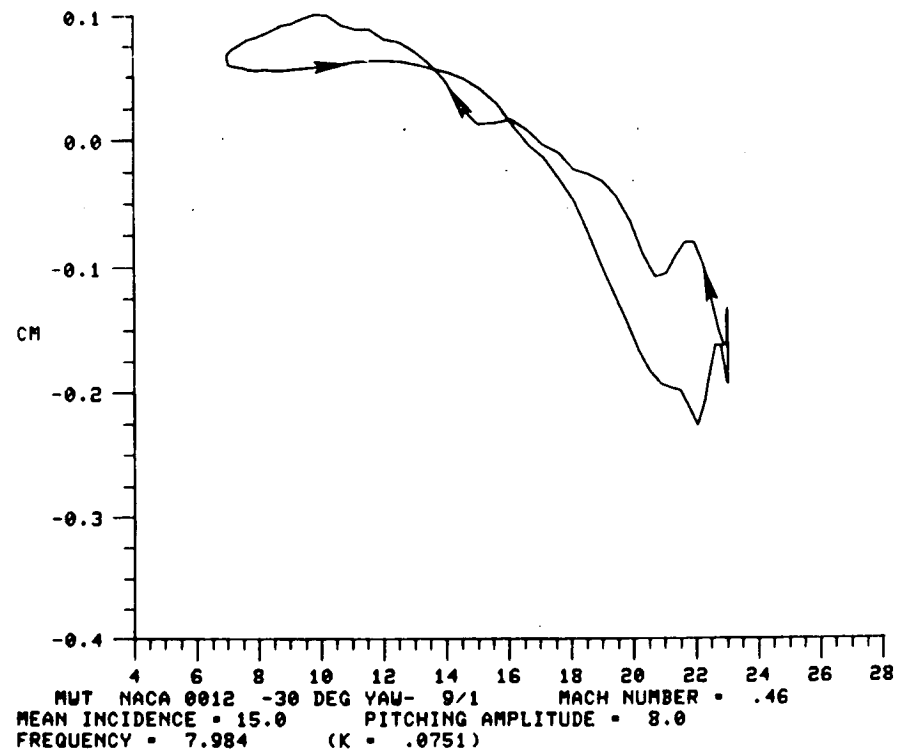
FILE 58. RUN1037.003



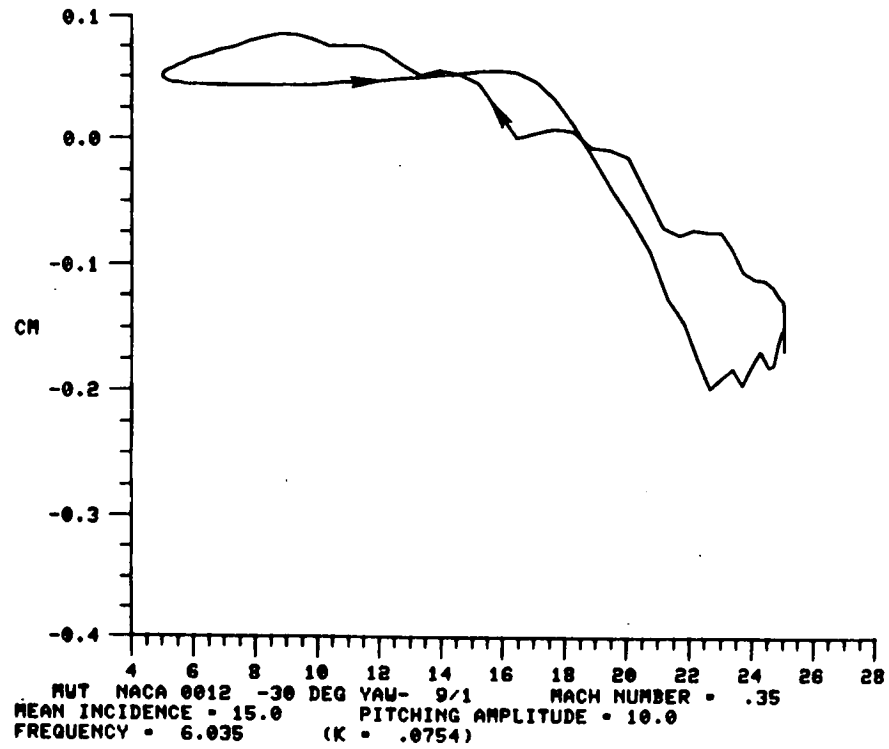
FILE 36. RUN1020.010



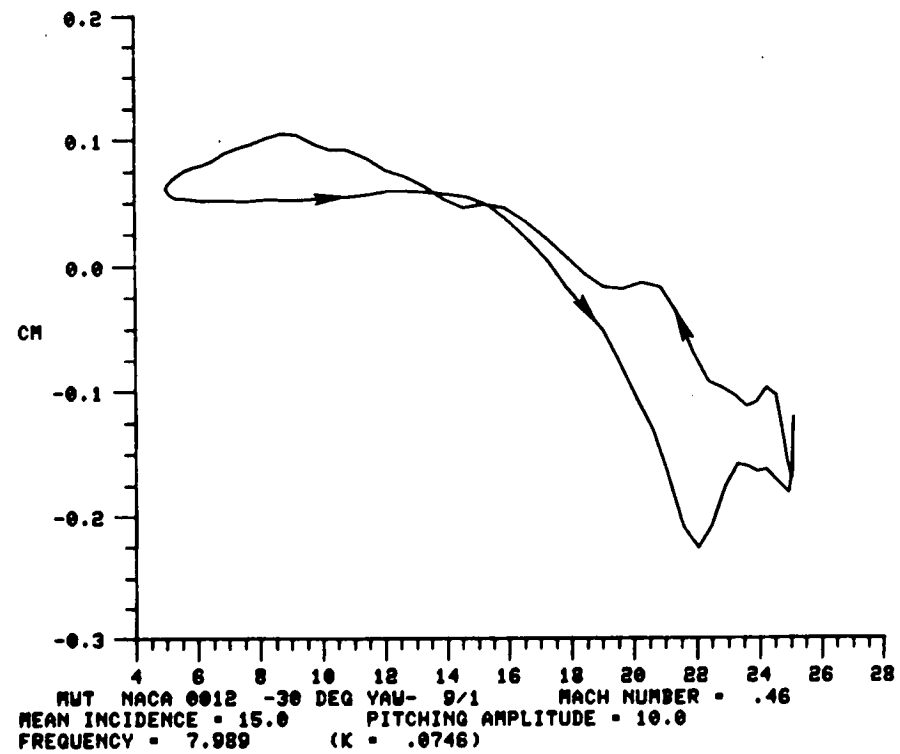
FILE 63. RUN1021.005



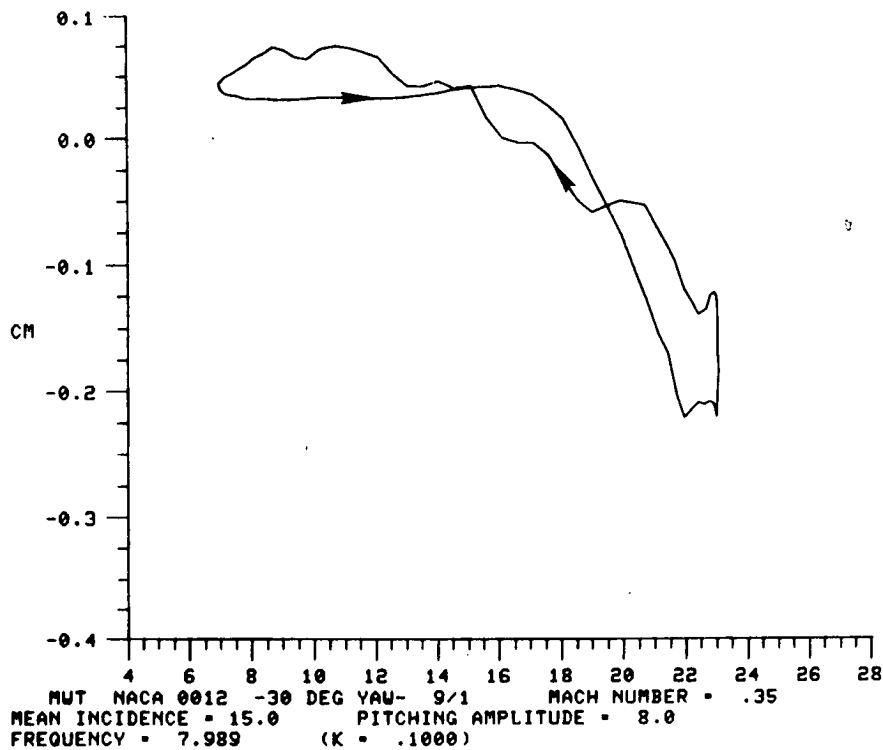
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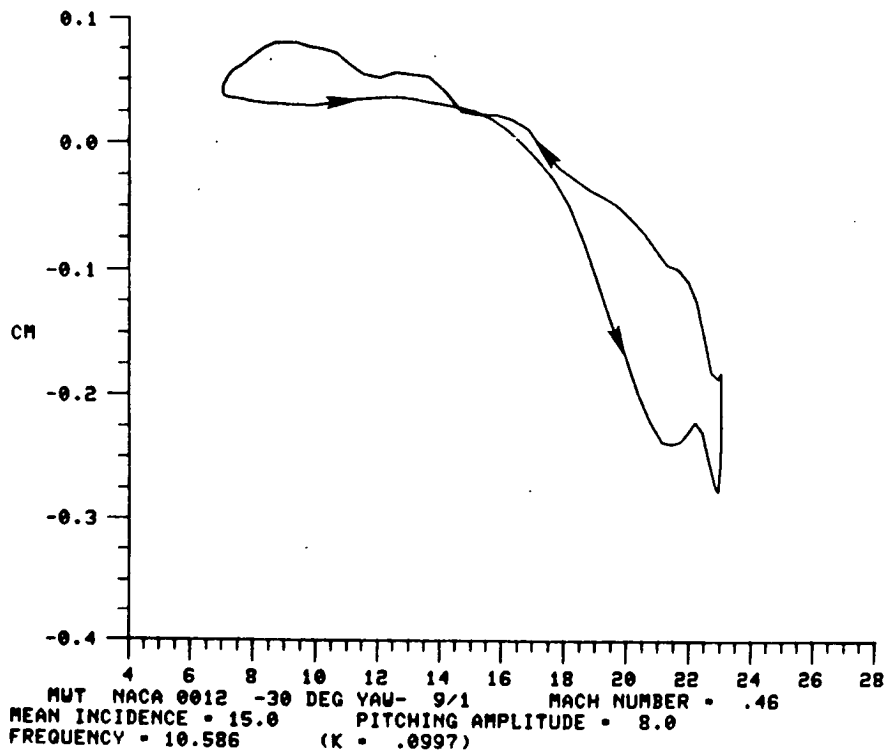
FILE 59. RUN1037.005



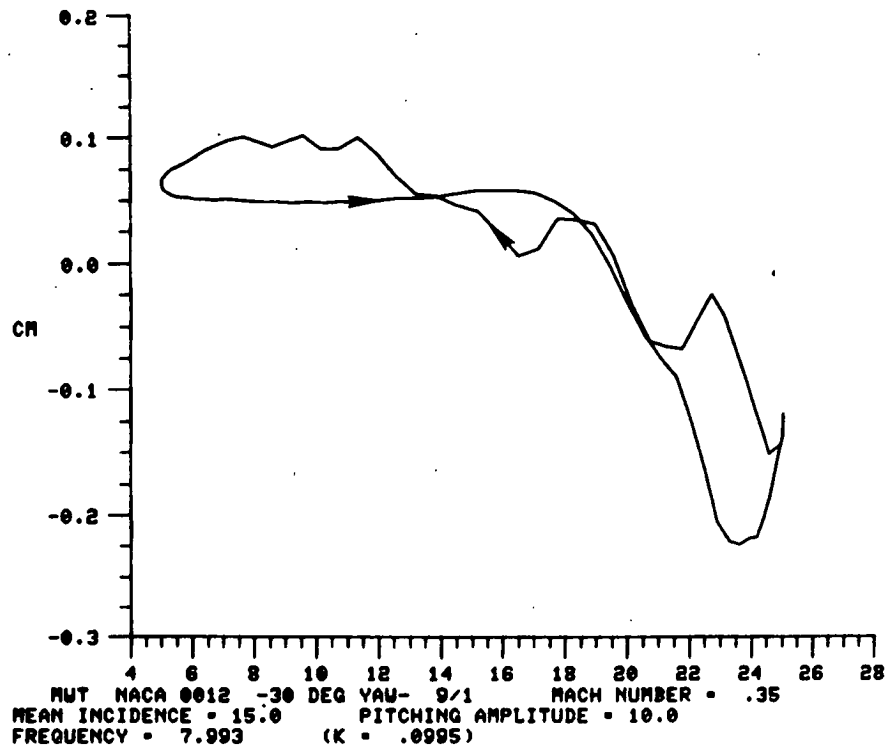
FILE 37. RUN1020.012



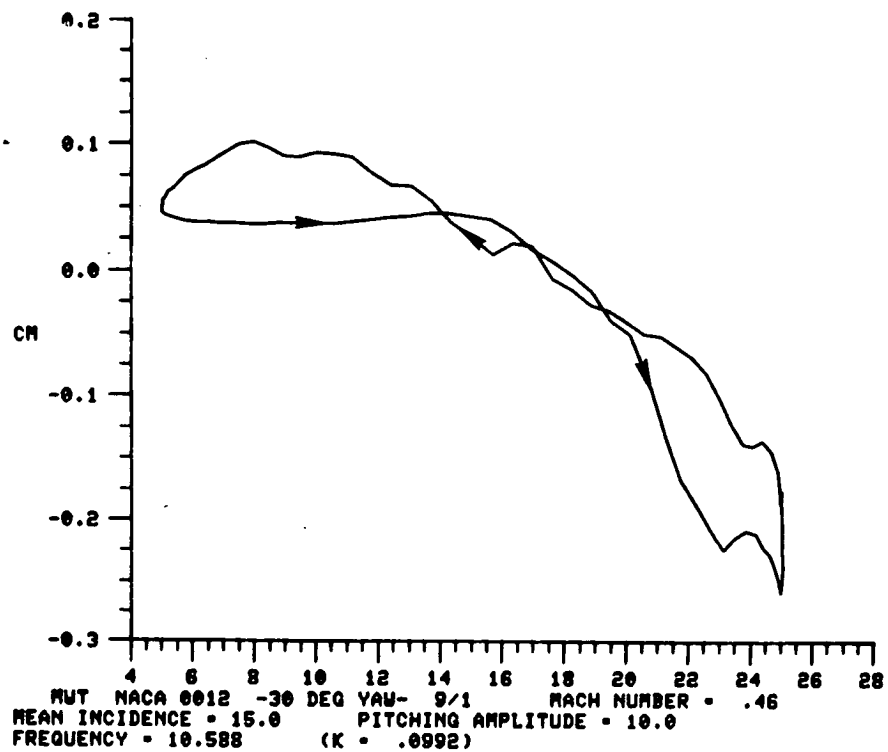
FILE 65. RUN1021.010



FILE 55. RUN1036.005



FILE 61. RUN1037.009



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